NATURE STUDY

SELF TAUGHT

Intermediate

WORK-BOOK

Grades V & VI

Manitoba Schools

By

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TORONTO

W. J. GAGE & CO., LIMITED

NATURE STUDY SELF-TAUGHT

Nature Study is alertness of observation by which we realize our surroundings,—the weather, the seasons, the trees, the birds, the living realm of things, the usefulness and fitness of all about us, the harmony and beauty of the commonplace, the appreciation and preservation of that in nature which gives soil its fertility, growth, and opportunity, and life, the blessing of it all.

The value of Nature Study, therefore, is in the development of alertness of observation, to perceive the beauty, harmony, fitness, and usefulness of all about us. This is a self-activity and is, therefore, self-taught.

This Work-Book affords an opportunity to work out our own ideas of nature's wonders in a thoughtful, meaningful way. There is a way to all truth, and the way is the all-important thing. Unrelated observations confuse the mind; they blur the truth. By grouping and relating observations we discover cause and effect, fitness and usefulness, harmony and beauty. On the printed pages you find illustrated groups of related things with obvious conclusions as to meaning, significance, relationship, and harmony. This is simply a way to a truth. On the blank pages you will show your way to another truth or beauty of harmony or fitness of things.

The first discovery will be that nature has a time-table, that nature has seasons, and that things are fittingly related in time and place. To be "on time" is excellent training; to be "seasonal" is to see the fitness of things and to feel in harmony with nature. Look ahead, survey nature's programme on the opposite page, plan what you are going to do, and do it on time and in season. If our senses are alert, we will scent the coming change in the weather, feel the change in the wind, and know its meaning, hear the wild geese overhead, and see the bursting bud that speaks of spring. Thus is foresight developed, and what is more important?

The second discovery will be that nature is practical,—that only those things survive which fit into their places and agree with their neighbours. See how Peter Rabbit, Danny Meadow Mouse, and Sammy Jay agree and live happy in the Green Forest.

And your third discovery will be that you are enjoying your place and your part in the world about you, as never before.

Thus is nature's lesson self-taught. Try it out. The knowledge gained will increase your pride in yourself, your school, and your province.

Each project or problem which you do yourself merits ten credits, and twenty such projects merit an intermediate badge in Nature Study, the same as in Boy Scout or Girl Guide work. Each question self-answered merits a credit, and ten answers are equal to a lesson, a story, or a set of drawings of some thing.

Now, don't say you cannot draw. Surely you can draw the flowers, the leaves, the animals, the birds if I can. I find them very easy to draw in simple outline as shown in these lessons. Just represent the shape and natural position, with as few lines as possible, and you will soon have reason to be proud of your handiwork. It is the proof of seeing; if you *see* the form, you can draw it.

The nature lover has an inquiring mind. So inquire about all the things that you would like to know. Your teacher will help you; everybody will help if you are in earnest. Write for the bulletins issued by the various government departments, ask questions of them, and do all you can yourself. There are four things to study: birds, insects, animals, and plants. Plan five lessons for yourself in each, and, when completed, your teacher will examine what you have done and sign each badge for you. Nature Study will then be your proudest achievement, because you have helped yourself.

V. W. JACKSON.

Winnipeg, March, 1928.

NATURE STUDY PROGRAMME

	JUNIOR BOOK *Grades III & IV* Observations and appreciation	INTERMEDIATE BOOK *Grades V & VI* Grouping and relationship	SENIOR BOOK *Grades VII & VIII* Application and economic importance
	Natural Phenomena: Weather and Sky: Relation to Agriculture		
Oct.	Daily records	Daily fluctuations,	Provincial records of rainfall, sunshine, temperature, evaporation, etc. and effect on agriculture, soil and vegetation maps.
Nov.	Monthly summary of sunshine, clouds, etc.	Wind direction, Frost effects	
Dec.	Moon and evening star Some star groups	Monthly star maps North Star clock	
	Birds: Winter Birds: Spring Migration, Families and Economic Value		
Jan.	Blue Jay	Winter residents	Insectivorous birds
Feb.	Winter visitors	Grosbeaks	Bulletin No. 52.
Mar.	Prairie-horned Lark		Breeds of poultry
	The Crow	The Crow Family	The egg and incubation
	The Robin	Woodpeckers	The Crow problem
Apr.	The Bluebird	Bird calendar	Gopher-eaters
	The Meadowlark	Hawks and Owls	Rodent destroyers
May	The Song Sparrow	Game birds	Ducks and Geese
	The Cowbird	Blackbirds	Game preserves
Sept.	The Canary	Warblers and Vireos	Game laws
	Insects: Beneficial and Injurious		
May	Giant Waterbug	Pond and ditch insects	Insect diet of birds
June	Butterflies	Aquarium	Life histories of grasshoppers and cutworms.
	Moths	Mosquitoes	
	Caterpillars	Flies	Other insect pests
Sept.	Collect cocoons	Beetles	Damage done
	Animals: Helpful and Harmful		
April	The Red Squirrel	Animal groups	The gopher problem
	Chipmunks	Rabbits	Loss through mice and rats
May	Frogs	Dog-like animals	Sheep and cattle
		The Weasel Family	
June	Snakes	Mice	Boys' and Girls' Clubs
Nov.	Dogs	Shrews	Activities
	Pets	Fur-bearers	
Dec.	Winter sleepers	Gophers	
	Plants: Wild and Cultivated		
April	Window boxes	The Buttercup Family	Germination of seeds
May	Prairie Anemone		
	Wild flowers		Propagation of plants
	Our shrubs and trees		
June	Desk bouquet, trees	The Rose Family	Transplanting of trees
Aug.	Garden and field crops	The Legume Family	Grains and grasses
Sept.	Wild fruits	The Daisy Family	Weeds: annual winter, annual and perennial

Twenty out of thirty topics would be a full year's work. Two topics a month, in season and on schedule time.

Four badges or 200 credits in two years or two grades earns a pass in Nature Study

WEATHER and SKY BADGE

"I Record the Sunny Hours"

Answer Credits ....
Drawing Credits ....
Colour Credits ....
Story Credits ....
Discovery Credits ....
Total 50

I declare
The work here credited is my own.
Signed ..... pupil
Certified Correct
Signed .....
Teacher or Inspector

BIRD BADGE

Grades V & VI

Answer Credits ....
Drawing Credits ....
Colour Credits ....
Story Credits ....
Discovery Credits ....
Total 50

I declare
The work here credited is my own
Signed ..... pupil
Certified Correct
Signed .....
Teacher or Inspector

FLOWER BADGE

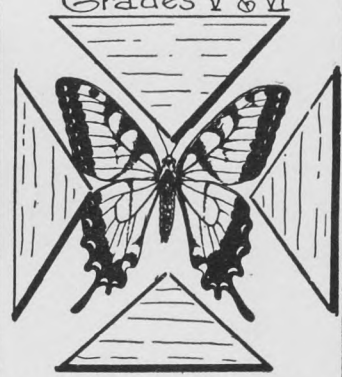
Grades V & VI

Answer Credits ....
Drawing Credits ....
Colour Credits ....
Story Credits ....
Collection Credits ....
Total 50

I declare
The work here credited is my own
Signed ..... pupil
Certified Correct
Signed .....
Teacher or Inspector

INSECT BADGE

Grades V & VI



MANITOBA SCHOOLS

Answer Credits ....
Drawing Credits ....
Colour Credits ....
Story Credits ....
Collection Credits ....
Total 50

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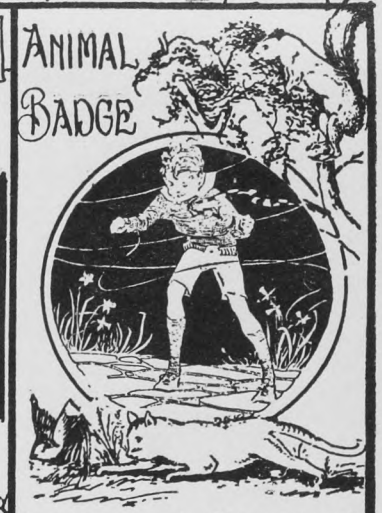
The work here credited is my own.
Signed ..... pupil
Certified Correct
Signed .....
Teacher or Inspector.

ANIMAL BADGE



MANITOBA SCHOOLS

Answer Credits ....
Drawing Credits ....
Colour Credits ....
Story Credits ....
Discovery Credits ....
Total 50

I declare
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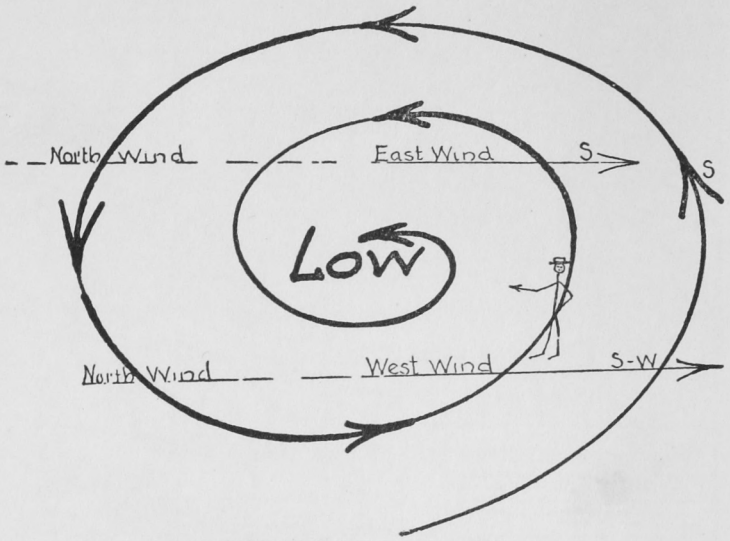
Signed ..... pupil
Certified Correct
Signed .....
Teacher or Inspector

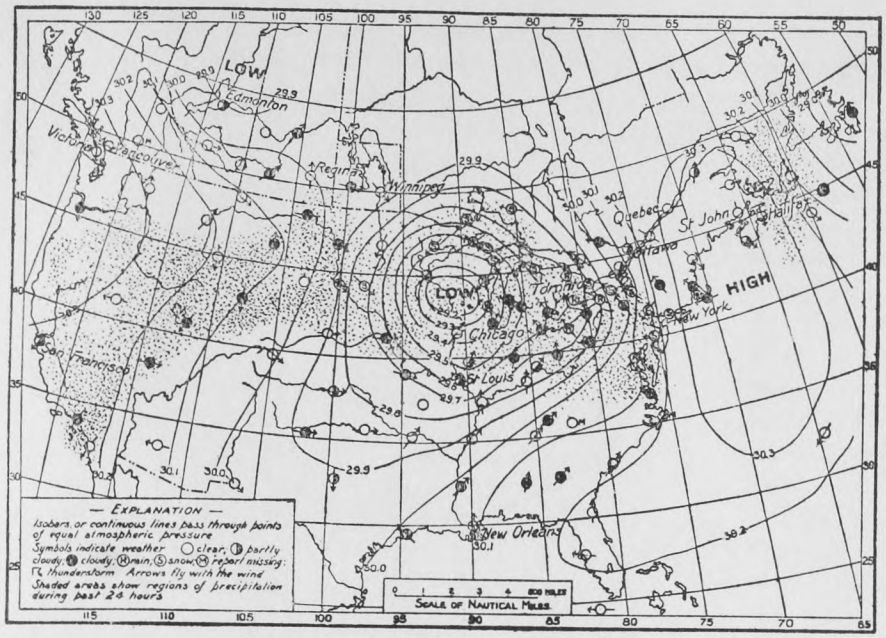
WHY THE WIND CHANGES

Just as a bonfire causes a draught towards it, as the heated air ascends in whirling eddies, so unequal heating of the earth's surface causes vast cyclones or wind cycles in an anti-clockwise direction over a radius of hundreds of miles, ascending at the centre like a vast whirlwind and causing low pressure or upward currents or sudden changes or violent wind storms followed by rain. Our great wind cycles start in Alberta and move eastward about 500 miles a day, so we can foretell a coming storm or wind change. Trace a spiral cyclone on tissue paper like the one here shown, and, by moving it over a map of Canada, you can see the wind changes at any one point. If the centre of low pressure goes south of your location, the wind changes from south to east to north, or anti-clockwise. If the storm centre goes north of your location, the wind changes from south to west to north, or clockwise. Therefore, if you observe the wind shifting from south to east to north, you know that the storm centre is passing south of you, and the more rapid the change, the nearer the centre of storm. By facing the wind, the storm centre or rapid change is on your right. If that be west, the storm is coming, if east, it has passed. Practise with your paper wind cycle on a map until you are familiar with the wind changes and the why, and then try to predict coming changes in wind and in weather. (If successful, 5 credits.) Read the daily forecast in the newspapers and observe correctness. (1 credit for each time.) Read weather maps as shown on page 6.



WHY THE WIND CHANGES

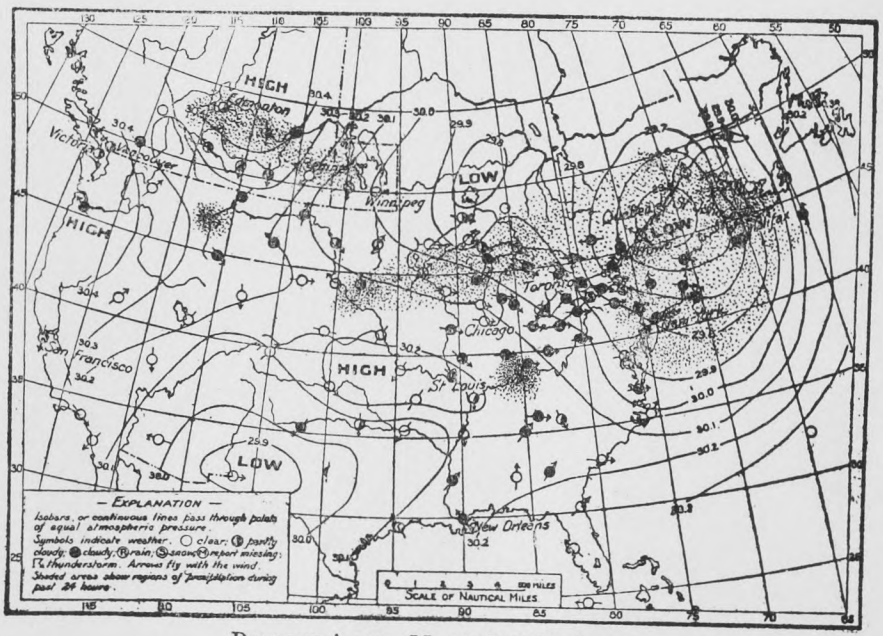
HOW TO READ A WEATHER MAP



Pressure Areas—March 6, 1908, 8 a.m.

Weather conditions of temperature, barometer, wind direction, and so forth are telegraphed daily to the Meteorological Service, Toronto, and a daily weather map is issued from there showing the storm centres and wind direction over all parts of the continent. Here are two weather maps on succeeding days showing how the storm travelled across the continent. On March 6th there were two low centres, one in Alberta and the other in Illinois. During the next 24 hours these low centres had moved eastward a thousand miles. The Alberta low centre passed north of Winnipeg and left behind it a snow storm, which reached from Alberta to Manitoba. Notice that the wind directions are anti-clockwise around these low centres and that during the day the wind at Brandon had changed from west to north, showing that the storm centre had gone north. Notice that the area behind the storm centre is cloudy and in front of it is clear.

The Illinois storm centre of March 6th moved eastward to Quebec during 24 hours, carrying a storm right across the Great Lakes. Notice the wind direction shown by arrows at the different places, indicating that the wind is going anti-clockwise around these storm centres and that cloudy weather prevails behind the storm centre. Cloudy weather is shown by the dark dots and clear weather by the white dots; the arrows show the direction of the wind, and the shaded areas show rain or snow. The Great Lakes and Hudson Bay and the Manitoba Lakes may be coloured red for clearness.



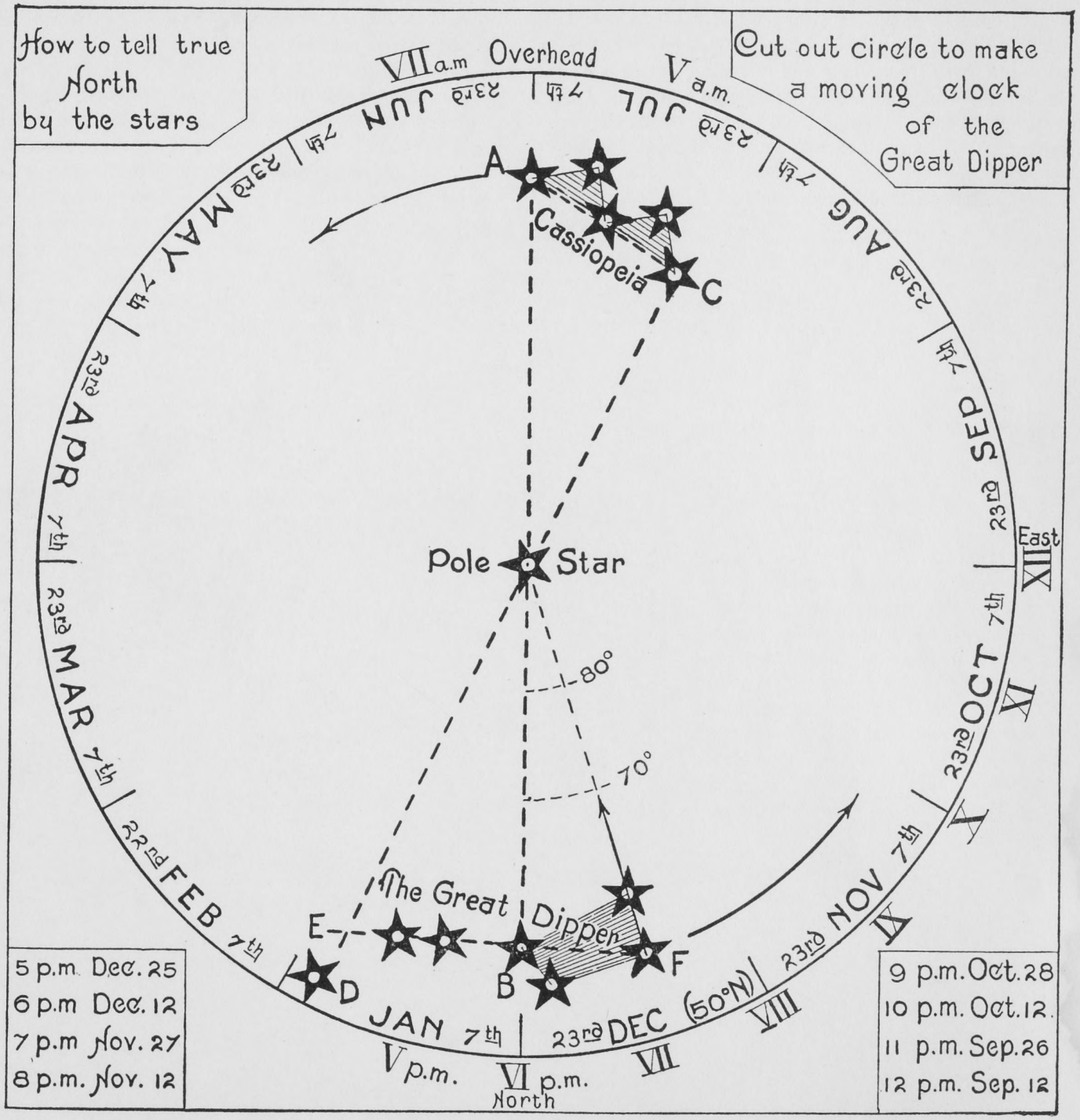
Pressure Areas—March 7, 1908, 8 a.m.

An annual weather report is published in the *Annual Crop Bulletin*, pages 10-11.

Send to the Physics Department, Manitoba Agricultural College, for weather maps if you have none in your school.

THE NORTH STAR CLOCK

Here is an easy way of reading the time of night and the time of year by the Big Dipper, the outer two stars of which point at the Pole Star and, like all the others, revolve around it once every 24 hours (23 hours 56 minutes) and a little more, so that it is continually moving farther on in an anti-clockwise direction. By using the other star clock you will see that the Big Dipper is overhead in May and low in the northern horizon in November (evenings). You can, therefore, make a simple North Star clock with a revolving card as here shown; or you can make it out of laths, putting the Big Dipper on one end and putting the "Big W" (Cassiopeia) on the other end. These two groups revolve round the Pole Star on opposite sides of it, telling the time of night and the time of year as here indicated. AB—CD—EF, shown on the drawing, are laths for holding the stars of the Big Dipper and the Big W in place, at the times shown in the lower corners.



A STAR CLOCK: PUPILS' WORK

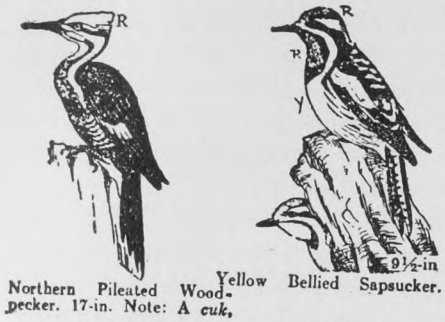
A STAR CLOCK

It is quite easy to make a star clock that will show the position and names of the important stars at any time of the year and any hour of the night, simply by making a complete map of the stars and revolving over it that part which is visible at any particular time. If you, therefore, cut out the diagrams on page 9 and page 53 as directed,—the first one circular, the second a square, the corners of which fold over the circle and, when tied back, permit the circle to revolve to bring that month of the year and day of the month opposite the hour of the evening at which you are observing,—then, holding the star map overhead, you will have the stars in their actual position with the names given. Nine-inch and 36-inch models, published by the Educational Book Company, Toronto, can be obtained from the Manitoba Agricultural College.

This star clock will also answer any question you may wish to ask about the stars, such as "When does Orion appear in the evening sky?" Revolve the circle until Orion appears on the east, and you will then see that this would be at 7 in the evening on December 12, or at 8 on November 26, or at 9 on November 12, or at 10 on October 27. "When will Orion disappear from the evening sky?" Revolve the circle until Rigel in Orion disappears in the West, and you will see that this occurs at 7 p.m. on May 10, at 9 p.m. on April 10, and at 11 p.m. on March 10. The evening stars will always be on the Zodiac or that path represented by the twelve constellations in large type on the circle touching Capricorn in December and Cancer in June. On the last Saturday of each month most newspapers have a monthly star map and tell where and what the evening stars are and in what constellation. In this way you can soon get to know all the stars and their movements.

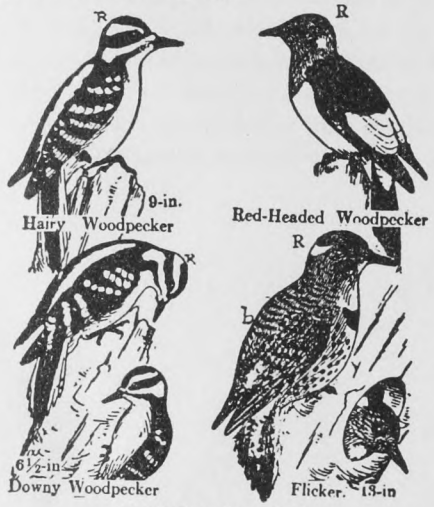
WOODPECKERS

This group of birds is easily recognized by the strong bill and woodpecking tendencies, some to get insects, wood ants, and borers, others to dig a hole for a nest, and the Sapsucker just to get the sap from the tree. Most Woodpeckers are brightly marked in black and white with red crests, and are easily recognized. The Pileated Woodpecker is much larger than the others, being the size of a Crow, with a bright red crest and striped neck. It feeds upon wood ants and is found principally among the spruce trees.



Northern Pileated Woodpecker. 17-in. Note: A *cuk*. Yellow Bellied Sapsucker.

The Hairy Woodpecker and the Downy Woodpecker are the only two that stay all winter and hence are easily recognized during the cool season. The Hairy is much the larger, nine inches long, the Downy six and a half inches; the males of each have a red patch on the head. As they live entirely upon insects, grubs, and larvae, they are beneficial, and, like all Woodpeckers, are very active and do much to add cheer to the woods. They seem made for trees, and the trees seem idle without them.

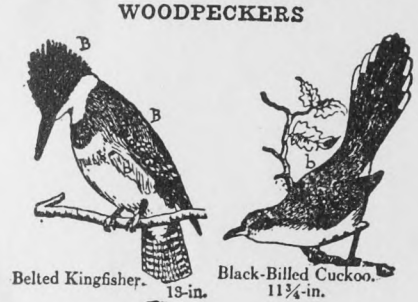


Hairy Woodpecker. Red-Headed Woodpecker. Downy Woodpecker. Flicker. 13-in.

The gayest of the lot is the Flicker. It has a yellow dotted breast, yellow under the wings, red crest, and black throat patch. The males have a black patch below the eye. These large birds, larger than Blue Jays, love to dig holes in hollow telephone poles. They soon find that they are hollow by drumming. They love to peck wood, and make a new hole each year, leaving the old one for Tree Swallows, Crested Flycatchers, and birds that couldn't dig a hole.

The Red-headed Woodpecker is the rival of the Flicker in gaiety of colour and love of telephone poles, but, as the Flicker arrives a month earlier, he usually has possession before Red-head arrives. All Woodpeckers lay glossy white eggs, which is another sign of close relation. What other signs do you know? With red ink or red paint show the red crest on all the Woodpeckers and the red head on one and the yellow breast on the other.

R—means red, O—orange, Y—yellow, G—green, B—blue, V—violet, P—purple, b—brown.



Belted Kingfisher. 13-in. Black-Billed Cuckoo. 11¾-in.

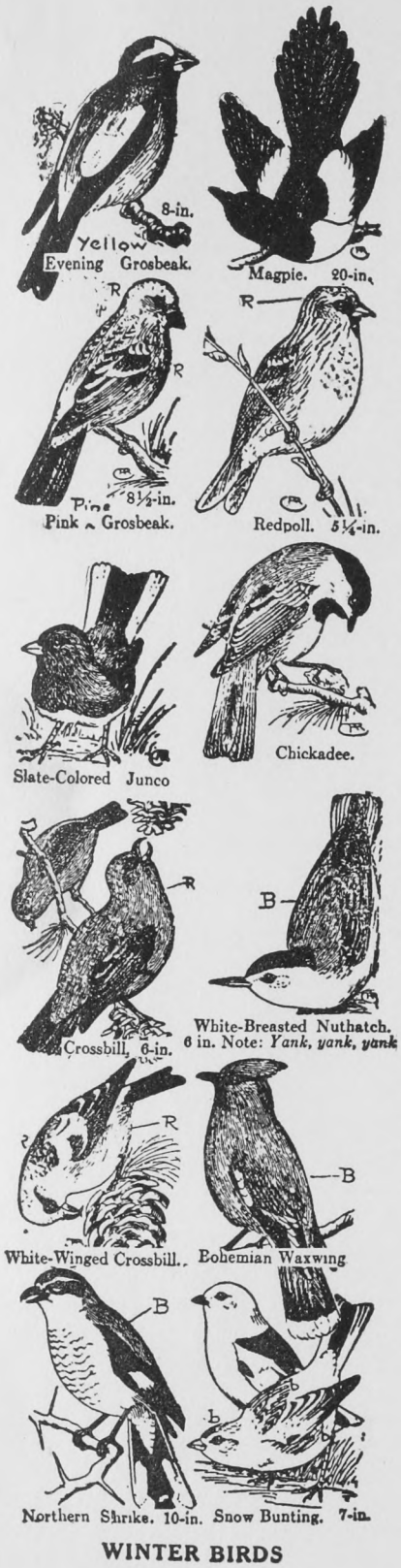
The Kingfisher, which is the same size as the Flicker, also has a large bill and gay colours. Its glossy white eggs indicate some relationship to the Woodpeckers, but it has taken to fishing for a living, and sits on limbs over streams waiting for fish, upon which to dart. Colour its head and back and collar blue, and part of its breast brown.

The Black-billed Cuckoo is quiet and retiring, and little known except for its mournful notes, but it is one of the most valuable of insectivorous birds, its favourite food being the tent caterpillar, which works such havoc to trees.

Whip-Poor-Will. Nighthawk.

The Whip-poor-will and the Nighthawk are closely related, both being night birds of speckled brown plumage. The Nighthawk is the better known, as it comes out more in the daytime and shows the two white spots on the wings which distinguish it from the Whip-poor-will. What are other distinguishing features? Compare their calls. Why have so few seen the Whip-poor-will? Upon what does the Nighthawk feed? See *Bird Bulletin*, page 7. What other birds feed on potato bugs? See page 7. Why do so many Nighthawks nest on the tops of buildings in the centres of cities? (5 credits.)

OUR WINTER BIRDS



WINTER BIRDS

The Pine Grosbeak, the Evening Grosbeak, and the Crossbill are easily recognized during the winter by the colour. The Pine Grosbeak is reddish or old rose colour when old. The Evening Grosbeak is yellow and black like a large, plump goldfinch; and the Crossbill is reddish all over with a bill crossed like thumb and finger when snapped. It is by snapping this bill that it gets the seeds from pine cones.

The Redpoll is also reddish like the Pine Grosbeak, but much smaller, and has more red on the head than on the breast. It feeds mostly upon weed seeds, while the others feed on maple seeds and the snowberry. The Chickadee and the Nuthatch feed upon bark insects and insect eggs. The Northern Shrike comes south to us in the winter, but seldom farther south than the Assiniboine River, and is seldom very common. Snowbirds move in great flocks and feed on weed seeds like the Sparrow and Longspurs, to which they are related. Colour the winter birds here shown and make your own drawings of them, that you may recognize the markings and get to know our winter birds.

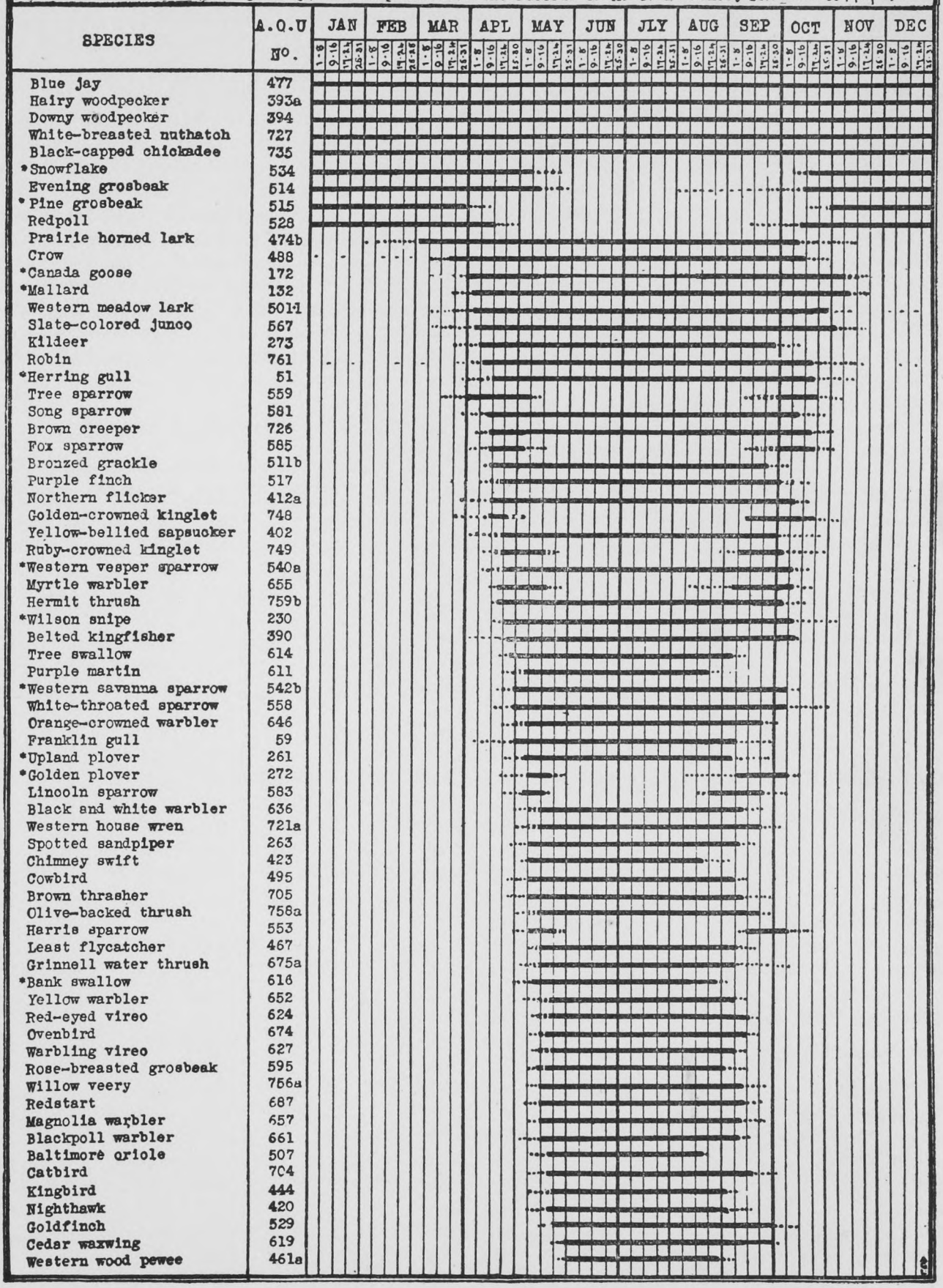
Of the Crow Family, the Blue Jay, the Canada Jay or Whiskey Jack, the Northern Raven, and the Magpie remain all winter; and sometimes the Crow also remains if it finds sufficient bait in dead carcasses that are left about during the winter.

Some forty birds stay all winter with us. The Eagles and the Goshawk feed upon rabbits. The other Hawks migrate south. The Arctic Horned Owl comes south this far and returns to the Arctic. The Barred Owl, the Dusky Owl, the Great Gray Owl, the Horned Owl, Hawk Owl, Long-eared Owl, the Robertson and Short-eared Owls, and the American Horned Owl remain all winter. The Great Horned Owl nests in March. How is it able to do this? All the Grouse remain all winter and also three Woodpeckers, the large Hairy Woodpecker, the smaller Downy Woodpecker, and the Three-toed Woodpecker.

Send to Victoria Memorial Museum, Ottawa, for a copy of *Birds of Western Canada*, by P. A. Taverner, paper bound, price 75 cents, cloth bound, price $1.25. This is a big book two inches thick with beautiful coloured plates and worth many times what the government is asking for it. Every school should have a copy of this book, and also a copy of *Prairie Birds* by B. J. Hales, 1927, and of Reed's *Bird Guides*, pocket size, for field study.

SEASONAL OCCURRENCE OF BIRDS IN SOUTHERN MANITOBA

Designed by, and compiled from the records of A. G. Lawrence, Corrected to May 1926.



A BIRD CALENDAR

"Saw a Horned Lark to-day" does not mean anything unless related to the usual arrival and departure of the bird. Unless your observations are placed on a chart to compare with other observations, year after year, your work and training will be of no value. By a bird chart, showing the arrival and departure of 70 birds in Southern Manitoba, in the order of arrival, it is possible to tell the new arrivals to expect in any particular week. The twelve months are divided into four weeks each. The first five birds on the chart stay with us all the year round. The next four are winter visitors from the north, going north in the summer again to their more northern breeding grounds. Of the 60 summer visitors, all but eight nest in Southern Manitoba,—the eight going on to their more northern breeding grounds. What are the eight summer birds that go farther north to breed? How long do they spend with us on their way northward in the spring? How long do they spend with us on their way southward in the fall? Which one is absent from Southern Manitoba for only two months (June, July)? What does this indicate? Why is it that the birds which arrive last are the first to leave? And when? How is it that we know nothing about the nesting habits or the nest of the Harris Sparrow, Lincoln Sparrow, the Plover, Myrtle Warbler, Kinglets, Fox Sparrow, or the Tree Sparrow? These are all southern birds, passing through Southern Manitoba. The Snowflake, the Evening Grosbeak, the Pine Grosbeak, and the Redpoll are northern birds, visiting us in the winter time and returning to their northern breeding grounds in the summer. Do we know anything of their nests? Why do birds go so far north for breeding? Why does the Snowy Goose go beyond Baffin Land into the unexplored Arctic region to build its nest and raise its young if not to get beyond its northern enemy, the Arctic fox? What other reasons can you give for birds coming north to raise their young?

Make a bird calendar chart like the one here, showing 70 birds, and show arrivals and departures of 30 other birds, thus making 100 birds, a fairly complete list for reference.

BIRD	A.O.U. No.	Average Arrival	Plus Dates	Average Departure	Plus Dates
Bohemian Waxwing	618	Oct. 27th	4	Apr. 7th	3
Lapland Longspur	536	Mar. 24th	6	May 12th	4
		Sept. 12th	2	Nov. 12th	2
Marsh Hawk	331	Mar. 31st	4	Oct. 20th	3
Red-tailed Hawk	337	Apr. 2nd	7	Oct. 17th	4
Rough-legged Hawk	347	Apr. 5th	4	Oct. 18th	1
Sparrow Hawk	360	Apr. 11th	7	Oct. 5th	4
Swainsons Hawk	342	Apr. 15th	3	Sept. 28th	1
Sharp-shinned Hawk	332	Apr. 19th	7	Oct. 27th	–
Bluebird	776	Apr. 9th	5	Oct. 20th	1
Red-winged Blackbird	298	Apr. 10th	5	Oct. 16th	4
Yellow-headed Blackbird	497	May 4th	5	Oct. 2nd	–
Rusty Blackbird	509	Apr. 10th	6	May 3rd	5
		Sept. 23rd	4	Nov. 5th	5
Purple Finch	517	Apr. 17th	5	Oct. 3rd	6
Phoebe	456	Apr. 20th	6	Sept. 20th	3
Mourning Dove	316	Apr. 21st	9	Oct. 12th	2
Black-billed Cuckoo	388	May 28th	3	Sept. 4th	2
Red-headed Woodpecker	406	May 27th	7	Sept. 14th	4
Ruby-throated Hummingbird	428	May 24th	7	Sept. 12th	5
Pintail Duck	143	Apr. 13th	7	Sept. 17th	–
Golden-eye Duck	151	Apr. 19th	6	Nov. 12th	10
Snow Goose (Wavey)	169	Apr. 20th	9	May 17th	2
		Oct. 16th	7	Oct. 20th	2
Scaup Ducks	148	Apr. 20th	8	Nov. 14th	8
Blue-winged Teal	140	Apr. 24th	4	Oct. 28th	5
Lesser Yellowlegs	255	Apr. 27th	6	Sept. 28th	3
Horned Grebe	3	Apr. 30th	5	Sept. 25th	1
Coot	221	May 1st	4	Oct. 9th	16
Bittern	190	May 1st	4	Oct. 24th	6
Sora Rail	214	May 9th	6	Sept. 21st	8
Black Tern	77	May 18th	4	Aug. 20th	4
Bobolink	494	May 19th	4	Sept. 20th	2

A BIRD CALENDAR

The numbers are those of the American Ornithologists Union (A. O. U.), and may be used as an index to any bird guide. Similar numbers mean similar birds. The sparrows and strong-billed seed eaters are from 514 to 605, and the insectivorous warblers, vireos, swallows, etc., from 611-761.

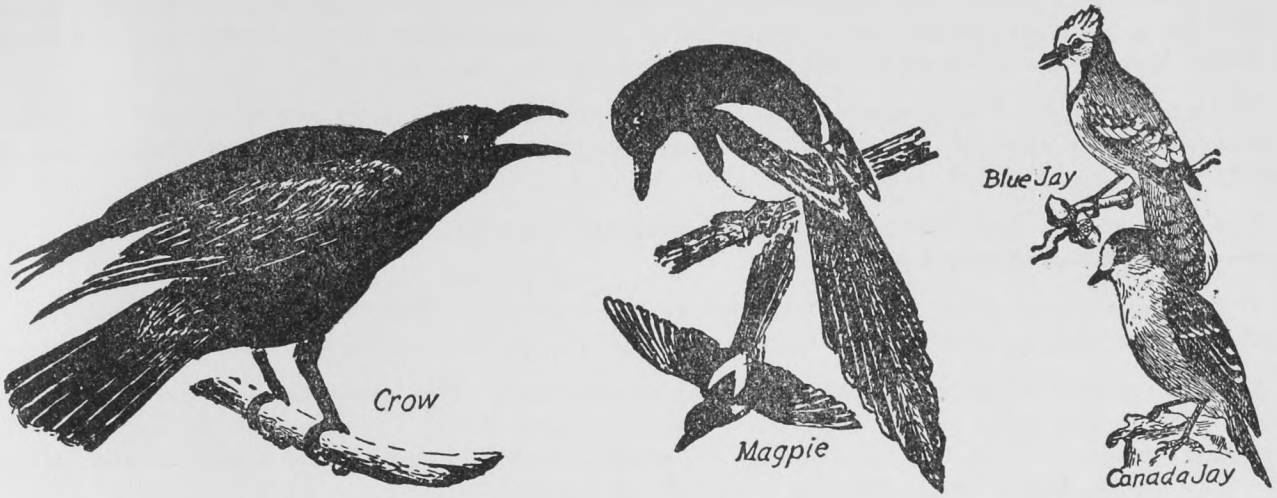
If this bird calendar is made neatly and correctly you will receive ten credits, and by sending your calendar for correction to the Biology Department, Manitoba Agricultural College, Winnipeg, you will receive a large chart 18 inches by 24 inches in colours.

The plus dates on your chart are exceptional dates and represented by dots at the end of the line which represents the average presence of the bird.

If you make a large chart for your schoolroom, your teacher will give you 10 credits, and the class can record all observations on it by coloured dots, say red one year and blue the next, and thus compare the years.

What becomes of the birds that disappear in the summer time? What proof have we that they have been north? Why do they spend several weeks with us in the autumn again? Why do they stay longer in the fall than in the spring? Why do the Oriole and the Hummingbird arrive just when the poplar catkins are bursting? Why are the last to arrive the first to leave? (5 credits.)

THE CROW FAMILY



The Crow Family includes the Crow, the Raven, the Magpie, and the Jays, all found in Manitoba,—a strange medley of gay vagabonds of wide range, capable of remaining in our northern latitudes during the winter, or migrating across the continent. All but the Crow are in the habit of spending the winter in Manitoba, and even the Crow will stay if any dead carcasses offer sufficient bait for the winter. All members of the Crow Family are noisy, talkative, bold, and cunning, making crude nests of sticks, and laying greenish eggs with brown blotches. And all have much the same call. The Crow "caw caw," the Raven "cauk, cauk," the Magpie "cak, cak," the Canada Jay or Whiskey Jack "ca-ca-ca," and the Blue Jay shouts "thief, thief, thief," he himself being a thief by birth and by family.

The Crow seems to have all the family characteristics, black as any, wise as a Raven, noisy as a Magpie, and gay as a Jay,—a sleek bird of ancient family, changing his habits with the needs of the situation, and offering excuses and "caws" for all he does. (See Bulletin No. 52, page 18.)

The Raven is all that the poet has suggested,—sinister, semi-sacred, mysterious, solitary, prophetic with ominous croakings, the sable satanic ruler of the bird world, officiating at the graves of the fourth generation, the hermit of birds, the voice of the wilderness. Like Socrates, with all his wisdom and cunning he goes a-begging,—a beachcomber from century to century. In keeping with his solitary nature, he lives in the solitude of the north, occasionally going as far south as the Riding Mountains in severe winters.

The Magpie is mischievous beyond the bounds of legitimate naughtiness, the gay prodigal of the family, dressed in black and white, talkative, mannerly, offering excuses for the cruelest of deeds, the picking out of eyes of helpless animals. Like the Crow, Magpies prefer the wooded areas, where they make rookeries in trees, crude nests of sticks where there are many arboreal birds close at hand for replenishing their larder.

The Canada Jay is a northern bird like the Raven, only coming as far south as the Assiniboine River in severe winters. Its audacity, boldness, and talkativeness have caused it to be named "Whiskey Jack" by the lumbermen, with whom it plays many pranks to enliven an otherwise tedious day. Although the smallest of the family, it is 11½ inches long. The Magpie, with its long streaming tail, is 20 inches long, the Crow 20, the Raven 25, so that all members of the Crow Family are fairly large birds.

The Blue Jay is the most beautiful bird of the family. Its blue feathers and black and white markings and crest give it a gay appearance in keeping with its cheerful disposition, loud call, and sprightly habit.

What have these six birds in common?

Make a similar grouping of Blackbirds and give common characteristics?

What makes a family group?

GAME BIRDS

The true "game birds" have a short, stout bill, the upper part curved down like a hen; a scratching foot with a hind toe, quill feathers, eggs eight to fourteen in a clutch, plain white or creamy colour. Nestlings are born covered with down, and active when hatched. This group includes Grouse, Partridge, and Pheasants.

The Grouse Family have the hind toe above the others, but no spurs,—nostrils and legs covered with feathers.

The Ptarmigan—pure white in the winter, chestnut brown in the summer. Range,—circumpolar, seldom coming south of Lat. 54°N.

The Spruce Grouse,—the darkest and smallest of the grouse, found only in the spruce area.

The Sharp-tailed Grouse,—the northern "prairie chicken", larger and darker than the southern form, 16.8 inches long, seven to fourteen eggs, legs heavily feathered, toes with "snowshoe" scales, no neck-tufts, but an inflatable air-sac on the males, V-shaped marks on the breast feathers.

The Pinnated Grouse,—with black tuft of sharp, spreading neck feathers exposing an inflatable air-sac, which makes that booming sound in spring, barred breast feathers. It has followed settlement northward.

Hybrids occur between the Pinnated and the Sharp-tail.

The Ruffed Grouse,—with a fan-shaped frill or neck ruff and a broad spreading tail; found only in the wooded areas of the province.

The Partridge Family,—smaller birds with short tails of 18 feathers, no feathers on legs, toes naked, without scales. This would include Quails, but none are native to Manitoba.

The Hungarian Partridge, or common European Partridge (Perdix Perdix), has been successfully introduced into Manitoba. It is a plump reddish quail with a short tail, and should be protected until well established.

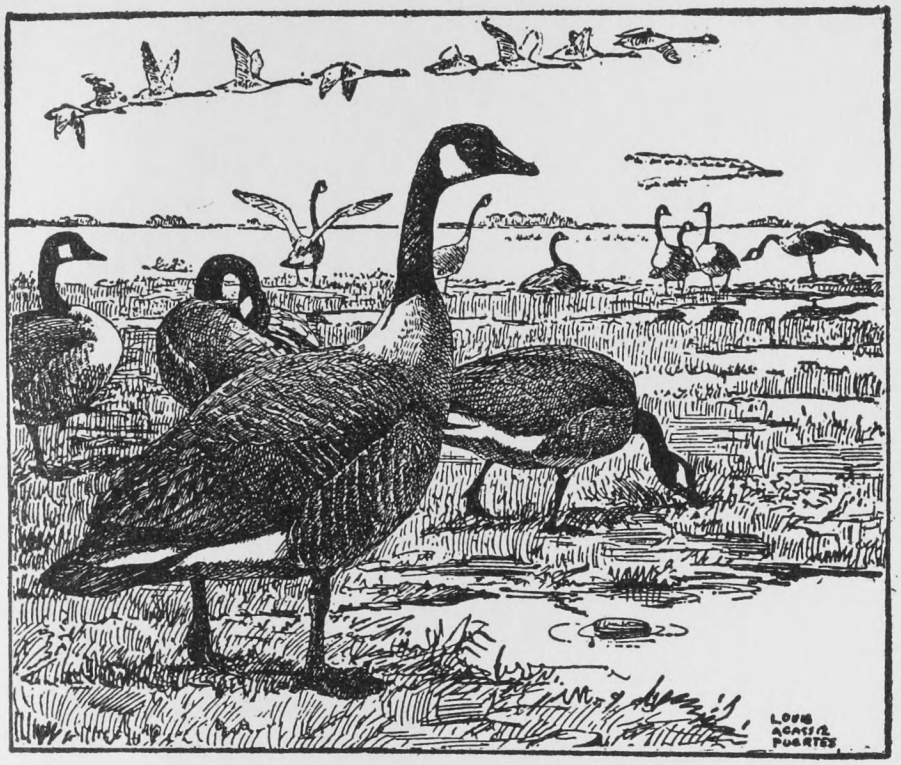
The Pheasant Family,—with long tail feathers and long wings, the first flight feathers longer than the tenth.

The Ring-necked Pheasant from China has been successfully introduced into the province.

The wild turkey of North America is classed as a Pheasant. What are its Pheasant characteristics? How long have we been domesticating it? Is it fully domesticated? What wild traits are still manifest?

WHERE DO THE WILD GEESE BREED?

The Canada Goose nested as far south as North Dakota in pioneer days and as late as 1901, and at Crane Lake, Saskatchewan, in 1905, Winnipegosis in 1913, Shoal Lake Preserve in 1925. The main body of Canada Geese go far north like the others but not so far, never to the Barren Lands. They usually stay within the tree limits, and often nest in large or hollow trees or old Hawk nests. They are the most versatile of the wild geese in nesting habits and range.



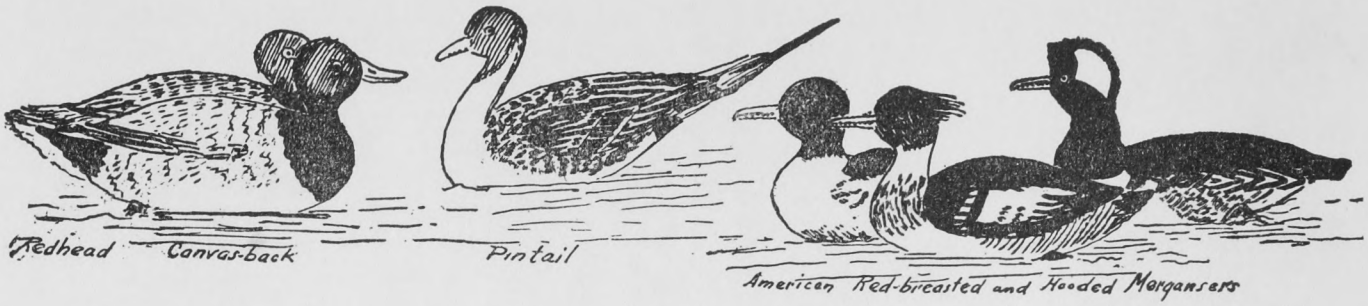
Hutchins's Goose is a small northern subspecies of the Canada Goose, of similar habits but arriving later and going much farther north to breed, usually along the Arctic Coast. The brant goes even farther north, nesting on the Arctic Islands around the Gulf of Boothia, where both the Eastern Brant and the Western Black Brant meet and perhaps interbreed.

The Lesser Snow Goose breeds so far north in Polar regions that very few nests have ever been found. One or two have been found at the mouth of the Mackenzie River, Franklin Bay, and Baffin Land.

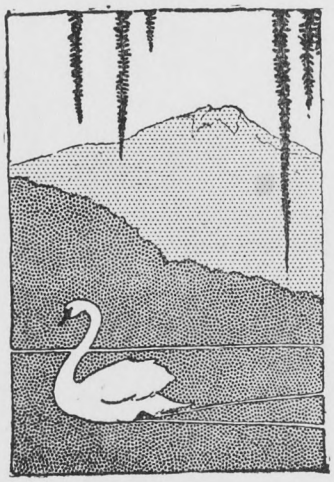
The Greater Snow Goose nests in northern Greenland, Ellesmere Island, Grinnell, and Grant Land. Locate these places. Although the Blue Goose goes north in thousands (150,000 were estimated to have come down in Shoal Lake in 1925, 200,000 in 1926), yet no one knows where they breed or spend the summer. Arctic explorers have seen the Blue Goose going farther north, but even the Eskimo could not tell them where the Blue Goose nests. MacMillan thinks they nest perhaps in the inaccessible region north of Baffin Land.

The Whistling Swan nests within the Arctic Circle and east to Baffin Land.

WILD DUCKS AND GEESE



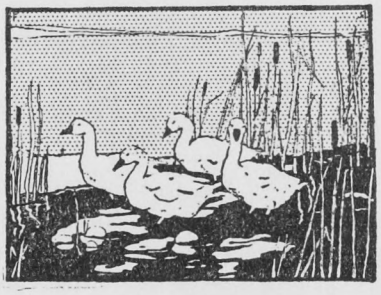
This important group of water-fowl includes most of our game birds and our domestic ducks and geese. The domestic Mallard is identical with the wild one, and the wild geese will live and breed with our domestic one. Both ducks and geese have plump bodies, short legs, and web feet. Ducks differ from geese in having smaller bodies, shorter necks, shorter bills, brighter feathers, and in the sexes being quite unlike. In geese and swans the males and females are alike, and swans have a neck longer than the body, which is always white. The swan in city parks is the same as the wild Whistling Swan. Young swans are called cygnets. Ducks' eggs are coloured: geese eggs are white. What other differences do you know?



White Swan

Mergansers have a narrow bill and a crested head (fish ducks)—Mallards and Teal have broad bills, beautiful wing feathers and breast plumage, and hind-toe without a "rudder" (river ducks). Other ducks have a rudder on the hind-toe (sea ducks). This includes the Redhead, Canvas-back, Scaup, (Blue bill), Golden-eye (Whistler), and Buffle-head. What other ducks do you know and to what class do they belong?

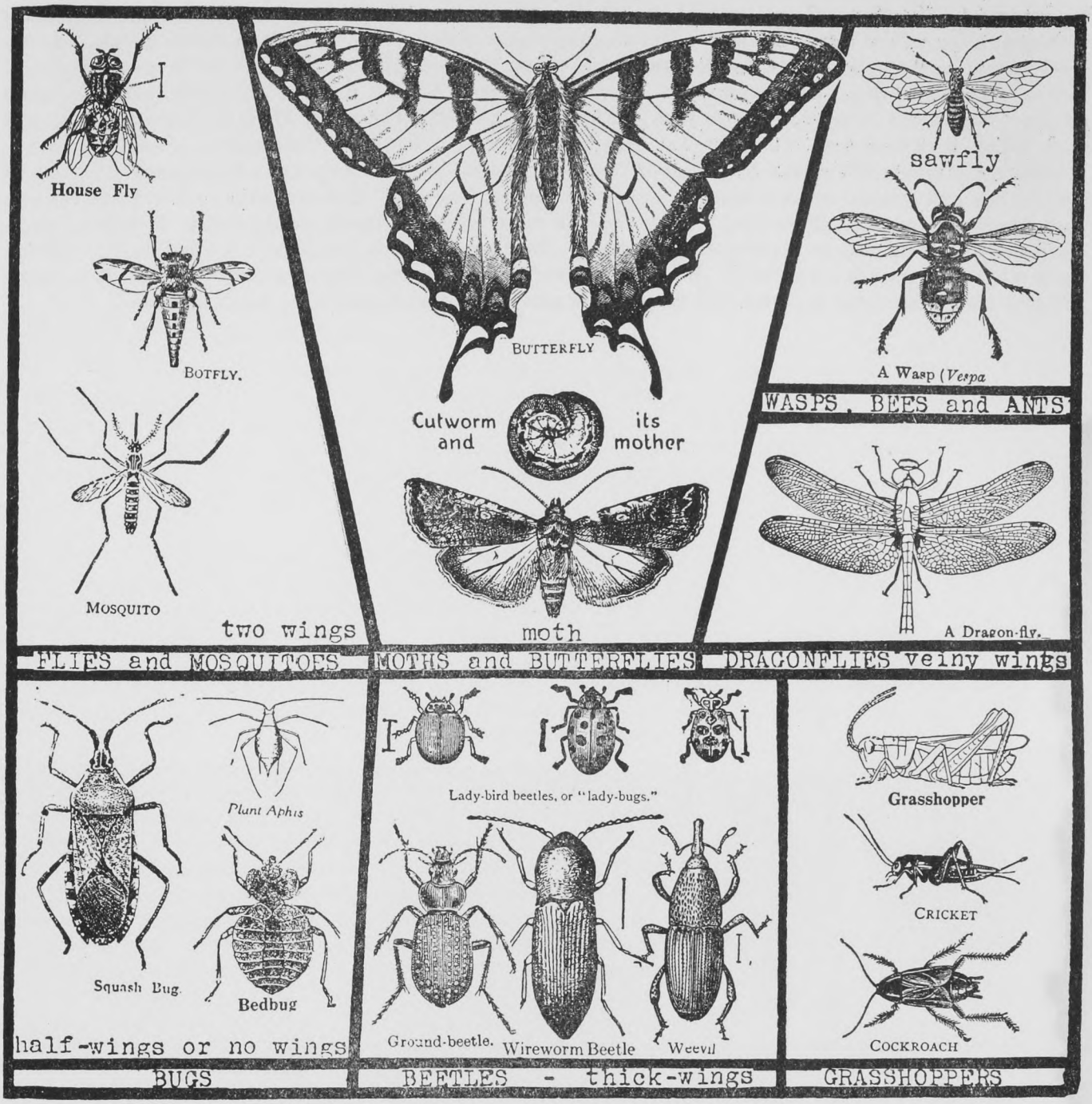
Our six wild geese may be grouped into brants and geese. Brants are dark in colour with head, bill, and feet black. This includes the Canada Goose or Brant and the smaller variety, Hutchins's Goose. The Blue Goose, Snow Goose (Wavey), and White-fronted Goose are pale in colour, with bill and feet pale or pink.



Snow Goose

KINDS OF INSECTS: PUPILS' WORK

KINDS OF INSECTS

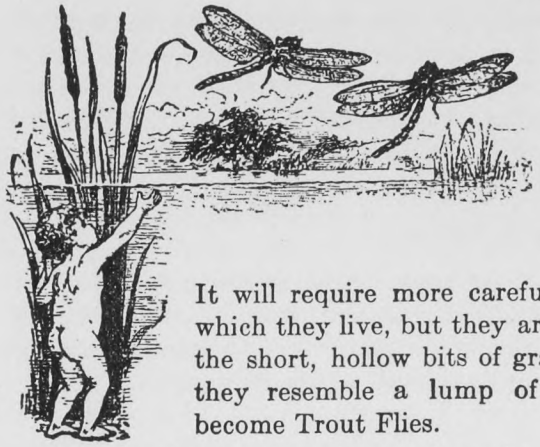


All insects have six legs divided into three sections. That is what insect means, in sections. The different kinds of insects are distinguished by their wings. All but one group have two pairs of wings. The group with only one pair or two wings is called Diptera, which means two wings, and includes Flies, Botflies, Gnats, Midges, and Mosquitoes. Moths and Butterflies have mealy wings (Lepidoptera)—a powder comes off their wings when rubbed. Butterflies are active in the daytime and Moths at night. The "Dusty Miller" which flies around your light on a summer night is the mother of Cutworms. Bees, Wasps, Hornets, Winged Ants, and Wheat-stem Sawflies have very thin transparent wings, and Dragon Flies have lacy and very veiny wings (Neuroptera). Bugs have no wings or only half wings (Hemiptera), and hence are poor fliers. Beetles have thick strong wings (Coleoptera), meeting in a straight line down the back and covering delicate flying wings folded underneath. "Lady Bugs" are Beetles. Why? And why wrong to call them Bugs? How do you distinguish the Lady Bugs? Count the spots on the back. How does a Weevil differ from other Beetles?

KINDS OF INSECTS

What harm do Weevils do? Grasshoppers and crickets have straight wings (Orthoptera), and are jumping insects with one strong pair of legs. Colour the Grasshopper brown with red legs, and the Butterfly yellow, and the Moth brown on the upper wings, and foreward pair; colour the Lady Bug red, Ground Beetle green, Granary Weevil brown, Bed Bug dark brown, Plant Aphis bright green, Squash Bug red and green, and the Botfly yellow. (5 credits.) Compare insects that you find or collect with the seven kinds of insects shown, and state which kind they are. (1 credit for each.) What kind are:—Lice, Cockroaches, Fleas, Cutworms, Wireworms, Maggots, Silkworms, May Flies or Fish Flies, and the one that looks like a Hummingbird? (1 credit each.) See pictures and classification in *Lessons in Zoology*, Grade IX Bulletin, pages 4-7. Name the two most beneficial insects. (2 credits.) Name the two most injurious insects in Manitoba. (2 credits.) How much honey is produced in Manitoba? (1 credit.) How much silk is imported into Canada? (1 credit.) Upon what does the silkworm feed? Where? (2 credits.) Name the large Butterfly shown. How many different insects have you collected and mounted on pins in a box and named? (1 credit for each.)

AQUATIC INSECTS



If we look in a water ditch or pond in April or May, we see innumerable wiggling and swimming things. Some are fully formed beetles and bugs—Diving Beetles, Water Boatmen, and Giant Water Bugs—others are filmy wigglers which will shortly turn into Dragon Flies, May Flies, and Mosquitoes. Skating on the surface of the water are the lively Water Striders, real bugs, however, of the order of Hemiptera, or poorly winged insects. It will require more careful looking to see the Caddice Flies jerking around the caddies in which they live, but they are there, and hiding from fish and other enemies by living in the short, hollow bits of grass stems, or plastering sticks or clay around their bodies until they resemble a lump of dirt. They become foolish only when they get wings and become Trout Flies.

If you wish to study the wonders of a pond, make a small drag-net out of cheese cloth; stretch the cloth over a wire loop and stitch it or pin it. Push this obliquely over the bottom to gather in some leaves and mud and grass with the insects; turn this up-side-down in a pail with some water in it, and pour into a large glass jar when you get home. When the water settles and clears, you will see things. If you put cheese cloth over the top, you will catch the winged insects which hatch from the wigglers.

The Giant Water Bug

This is the largest of our aquatic insects and most likely to attract attention, particularly as it leaves the water at night and flies to the light, where we so often see scores creeping on the ground or sidewalk. Although fierce looking, with two large front claws, it is perfectly harmless to handle and makes no effort to fly away; in fact, thousands are killed in cities by pedestrians stepping upon them. The allurement of light is common to all nocturnal insects, perhaps due to the fact that they see thousands of lights where we see only one, so peculiar is the compound structure of an insect eye. The eye of the House Fly has two thousand eye facets; the Dragon Fly has twelve thousand eye facets; beetles have twelve thousand eye facets; Butterflies have nine thousand eye facets in each eye, and as many lights will be seen as there are eye facets in such wonderful eyes. The Giant Water Bug is not so stupid in water as out. It hides under leaves and sticks, and, with its strong front claws, grabs minnows and tadpoles and small frogs, etc. With its dart-like beak, which gives it its name "Belostoma," it stabs them and sucks their juices, injecting poison into the unruly ones. Being the length and breadth of one's thumb, it is the mammoth among aquatic insects, and must strike terror into smaller life, but it is as helpless as a fish when out of water. All insects whose wings overlap like the large leathery ones of the Giant Water Bug are poor fliers. They can seldom fly, and are called "bugs," or Hemiptera, which means "half-winged." Many have lost their wings altogether through disuse, e.g., Bed Bugs, Water Striders, Plant Lice, and others. The term bug, therefore, can correctly apply only to wingless or poorly winged insects.

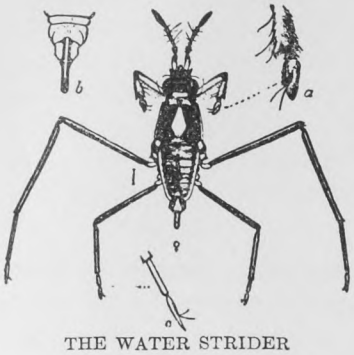
The Giant Water Bug comes to the light.

The Giant Water Bug lays about sixty tiny brown eggs on the grass and leaves around ponds. When these hatch, the young worms crawl into the water and gradually turn into long-legged nymphs, which, when fully grown, moult and come forth with wings. At what time of the year do we find most Giant Water Bugs coming to the light? Would you judge that they had wintered through as beetles, or that they had developed to this size the same summer?

Water Boatmen and Backswimmers

These two water bugs are well named and easily recognized. The Water Boatman propels himself with one long pair of legs (the last pair) and thus resembles a boatman rowing. He is less than half an inch long, and is very active and voracious. One kind (*Notonecta*) has

a habit of swimming on its back—hence it is called the Back Swimmer—and, like the shark, finds this position more suitable for attacking its prey, which it seizes from below. They are often seen clinging to the legs of large beetles and aquatic insects. All water bugs are carnivorous and voracious. They show their true bug characteristic of a disagreeable odor when taken out of their element. They can fly, however, and so the aquarium should be covered with a piece of cheese cloth if you wish to retain them.



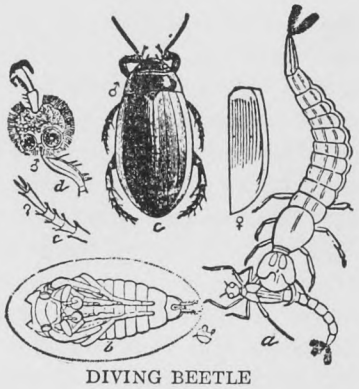
THE WATER STRIDER

The Water Strider

Water Striders are a wonder to most boys. How anything can skate on the water and not get wet is a mystery! Nor can you drown them. They are covered with fine hairs, which hold air and prevent their becoming wet. If you place a dry needle carefully on the surface of a glass of water, it will float. In like manner, the dry, padded feet of the Water Strider enable it to skate on the surface. Thousands of them are found out on the ocean, hundreds of miles from land, skating about and feeding on dead fish. On the pond they also feed on the dead things that float on the top.

The Diving Beetles

Beetles are easily recognized by their smooth, shiny backs, rounded and oval, with wings meeting in a middle line down the back—the outer pair of wings being hard and protective—the inner pair being filmy for flying. The Diving Beetles are well named, as they continually come up for air and dive to the bottom again. When at the top, they are headed downward, taking in air through the tail end. They fill the air space between the wings and the body, and then dive below, where they can stay for an hour if necessary. The Water Scavenger is another water beetle closely resembling the Diving Beetle, but its back is more rounded and shiny, and it is silvery below due to an air film. As the name implies, it is carnivorous and a scavenger, like the snail, keeping the pond from becoming putrid.



DIVING BEETLE

All insects undergo great changes (metamorphoses). The Diving Beetle hatches into a worm-like, transparent wiggler, and develops a big head. It somewhat resembles the larva or aquatic stage of the Dragon Fly, but is more pointed and has a white stripe down its back. It regularly comes to the top for air, and, like most aquatic wigglers, breathes through two tubes projecting from its tail end. When fully grown, about an inch long, in July, it burrows into the soft mud at the edge of the pond and turns into a Diving Beetle.

The Dragon Fly

The Dragon Fly spends its youth as a wiggler in the water; in fact, it spends three years as a wiggler and only three weeks as a beautiful Dragon Fly. Still more peculiar is the May Fly, which spends two or three years as a wiggler in muddy waters, and only one day with gossamer wings in the joyous realm of air. Dragon Flies feed voraciously on flies and such insects as they can catch on the wing, swooping down upon them like a hawk upon its prey, and by some are called "Mosquito Hawks." A Dragon Fly will devour a House Fly in a few seconds if placed in its powerful jaws. As they have no destructive habits, they may be considered beneficial on account of the flies and mosquitoes they devour. How does such a beautiful insect come from such an unsightly wiggler? It is like a fairy tale, and yet any one may observe it by keeping these wigglers in a glass with grass stems and looking at it each night before bed time. They always change at night, and one night you will see the larva crawl up a grass stem, back out of its shell, and come forth like a winged fairy.

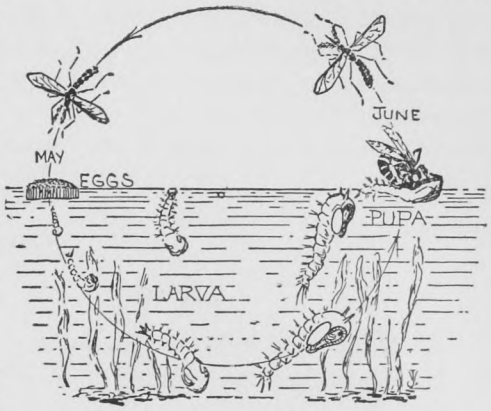
LIFE HISTORY OF DRAGON FLY

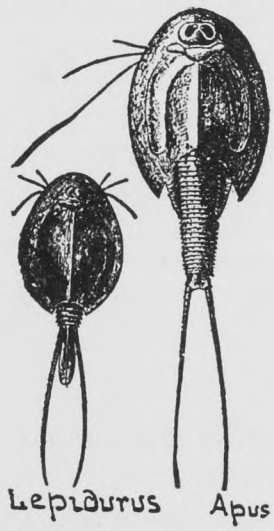
AQUATIC INSECTS

May Flies and Mosquitoes

May Flies and Mosquitoes emerge from the larval wigglers in the same way as Dragon Flies. The larvae of May Flies and Dragon Flies have gills and can therefore stay below, while the Mosquito wigglers, having no gills, are forced to come to the surface to get air, through the tail, like other gill-less wigglers. May Flies are also called Day Flies (*Ephemeridae*) because they live only a day as a filmy fly. Their empty shells (moults) often form wind drifts on our shallow lakes, and cover the shores inches deep. Like weed seeds, the larvae may remain in the muddy waters for three years if conditions for changing to fairies are not favourable; hence, in a favourable year, three years of larvae may come forth and thus produce enormous quantities.

But where does the Mosquito come from? They seem almost as common on the dry prairie as around the lakes and swamps. Are they blown over the prairies, or do they hatch in the grass and leaves? If so, how do the wigglers wiggle? The life history of the Mosquito in a rain barrel is easily understood, but there is much about the development of the Mosquito on the prairie that is little understood; and the farther north, the greater the number of Mosquitoes, and the longer their season. Why? How does the male Mosquito differ from the female, in feelers and in mouth parts? Why? Why does the male not bite?

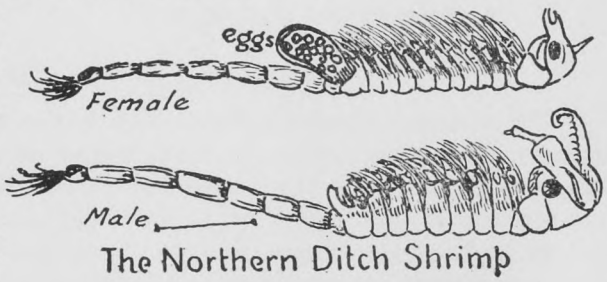




Fresh Water Shrimps

The most beautiful thing in the ditches and ponds of the prairies is not an aquatic insect, but a filmy Crustacean or Shrimp, chestnut brown in colour, and about the size of an acorn. The thin brown carapace or body shell covers sixty pairs of feathery gills, which move incessantly in the most graceful rhythm. This beauty is expressed in the name "Phyllopod," or feathery feet. These aquatic fairies are strictly western, and are not found east of the Mississippi or Red Rivers. Their ability to thrive in ponds and ditches which dry up quickly is due to the vitality of the eggs, which drop to the bottom, dry up with the pond, and hatch with the rains of the next spring.

Even prettier than the Shrimps with a shell are those without a shell, which can be found in nearly every Manitoba ditch in May. They are reddish, and about half an inch long, always swimming on their backs, near the surface, their dozen pairs of feathery legs waving rhythmically like grain in a breeze. Watch their beautiful movements in a glass jar on your desk.



The Northern Ditch Shrimp

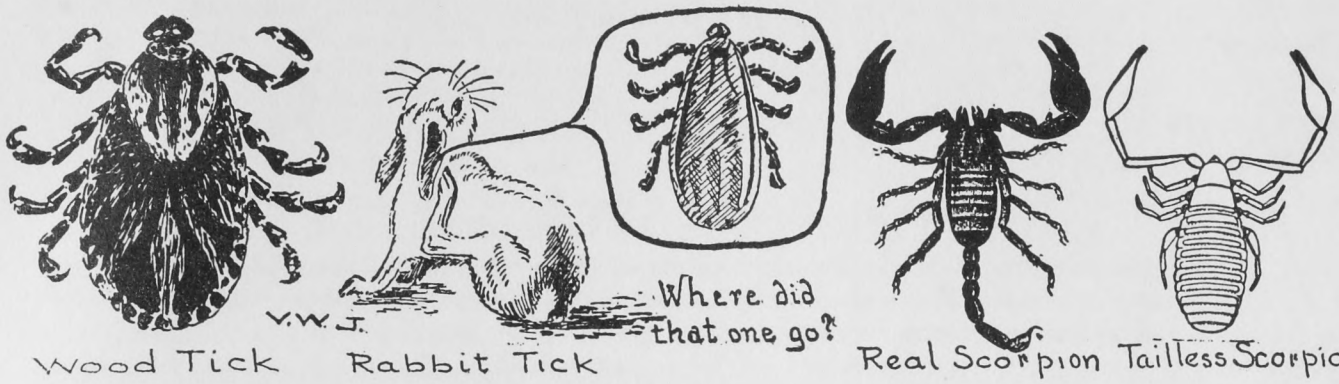
Do they ever leave the water like water bugs and beetles? They have been hatched from eggs in the dried mud from the bottom of ditches. Then couldn't these eggs blow or drift from ditch to ditch?

Questions

1. How do Fresh Water Shrimps or Crayfish differ from insects? 2. Why do insects undergo such changes of form (metamorphoses)? 3. How do you think Mosquitoes winter through? 4. Why are Mosquitoes so bad in the far north? 5. Are they getting less with increased cultivation and drainage? 6. What insects and birds tend to keep the Mosquito in check? 7. Which Water Shrimp have you found? 8. What becomes of these delicate Shrimps when the ditch dries up? 9. How have they spread in nearly every ditch in May?

Address correspondence to the Biology Department, Manitoba Agricultural College.

INSECT ALLIES



Daddy Longlegs, Wood Ticks, Cattle Ticks, Red Mites, and tiny Scorpions look and act like insects, but they belong to the Spider Family with eight legs. Insects have six legs; the Spider Family, eight. Insects are in three sections, Spiders in two, Ticks in one body part. Daddy Longlegs has no waist-line, just one body part and eight very long legs from the under side. These long legs are suited to running over the tops of grass blades and catching insects like Spiders. Does the Daddy Longlegs spin a web? Is it harmful or beneficial? Should you torture it to find out "Where your cattle are?" Do you think it knows? Why the superstition? (5 credits.)

Comparison of Spiders and Insects

Spiders	Insects
Eight legs and body in two parts.	Six legs and body in three parts.
No wings, but run rapidly.	Wings, but run slowly.
Weave web from tail spinnerets.	Weave cocoon from mouth.
Hatch out tiny active Spiders.	Hatch a crawling maggot or caterpillar.
Spiders all sizes.	Insects, always one size (adult).

1. What other differences have you observed?
2. In how many ways is the Wood Tick spider-like?
3. How does the tiny harmless Scorpion, found around houses, differ from the Wood Tick and the Spider? (See drawings above.)
4. How does it differ from the real and larger Scorpion found under stones on the dry prairie (Saskatchewan and Alberta)?

Wood Ticks

The common Manitoba Wood Tick is the American Dog Tick (Dermacentor variabilis). The starved spring adults are searching for animals from May to July. They will engorge upon dogs, cattle, horses, or humans,—from the size of a flax seed to the size of a large bean in a day or so. The engorged female drops off, in a week or so, and lays 3,000 to 5,000 eggs, on the grass or in the leaves. These hatch in a month or so, and the six-legged larva seeks an animal, engorges blood, drops off to moult, and becomes an eight-legged immature, which must engorge again to become an adult by spring. If lucky in finding animals, it may complete its life cycle in six months; but, if unlucky, it can go a year or more on one blood feast. Normally it has three feasts a year, and the dog is the usual unlucky host. Nicotine or a hot needle will force the imbedded tick to come out. Use peroxide of hydrogen on the bite.

Self-Taught Exercises

1. Remove two or three engorged wood ticks from a dog's ear, or place two or three on your dog's ear until they are engorged, and then place them in a pill box, and record how many laid eggs, how many eggs each, what colour, what size, what time of the year. (5 credits.) Record if the eggs hatch. (10 credits.)

2. Make drawings showing size before and after engorging on blood. The larger engorged ones are the females, which lay the eggs. Draw the under side showing the mouth and eight legs. (3 credits.)

3. Examine dead rabbits, birds, or gophers for ticks. Are they the same kind of tick as on dogs? (2 credits.) Send them in to the Biology Department, Manitoba Agricultural College, Winnipeg, for identification and credit. (3 credits.)

The Tiny, Tailless, Harmless Scorpion

During the spring there is found throughout Southern Manitoba a tiny, tailless, harmless Scorpion often mistaken for a Wood Tick or a Bed Bug, as it is brown, and about the same size. But it is a tiny Scorpion with pinchers or claws like a Crab or Crayfish. It is always waving these about in search of insects and is thus easily distinguished from Wood Ticks. It is beneficial, as it lives upon white flies, plant lice, and other tiny insects. It is found around houses, most likely to be seen crawling over white cloth. It crawls sidewise like a Crayfish and is always feeling with its pincher claws, as it cannot see. Make a drawing of the one here shown, so that you will know it when you see it. Twenty-six were sent in during the spring of 1925 from various parts of Manitoba, showing that it is quite common. Send it in when you find it and get 5 credits for your sharp eyes. It is perfectly harmless and will live in a folded paper in an envelope. Show it to your teacher and your classmates before sending it to us for credit.

A real Scorpion over an inch long, with a long, jointed tail, lives under stones on the dry prairies in Saskatchewan and perhaps in Western Manitoba.

1. Draw a Scorpion natural size, and colour it brown.
2. How do Scorpions sting?
3. What countries are troubled with Scorpions?
4. Have we any dangerous pests?

DICK FLICKER AWAKES FROM HIS WINTER SLUMBER

A MANITOBA BEDTIME STORY

When Dick was fixing up his bedroom after the freeze-up last fall, he thought he could hear scratching and digging in the next room, and all winter he dreamed of Billy Badger, and he would jump in his sleep when he dreamed Billy was getting through into his room. But Billy was sounder asleep than Dick and many holes away. Just the same, you can hear sounds underground very clearly, and Dick knew there was some digging going on after he went to bed. He awoke two or three times during the winter, but could hear nothing,—just felt cold and stiff, and coiled up tighter than ever. Once he got up and tried to walk along the hall to the pantry, where he remembered he had put some wheat heads, and went to sleep as soon as he felt straw. When he finally awoke, he found wheat right at his nose, and the smell of it made him long to get out in the fields again. He nibbled several heads of wheat; he was so hungry. Then he felt better and began to look for light, for he had not seen anything for nearly six months. By digging away a little loose dirt that filled the entrance, the light came in, and Dick was free. The sun was shining, but Dick Flicker couldn't see anything. He was dazed. He blinked, but his eyes wouldn't work. Still the sun felt so good, the warmth so comfortable, that he basked there until his eyes got used to it, and he could see that the snow was gone. He flicked his tail and felt like whistling for his mates but was afraid Billy would hear him, or some hawk or owl. So he kept quiet the first day, but oh! so restless, with the joy of spring again. Early the next day he ran over to the next hole, but there was no one there. He heard a sharp whistle several holes away, and he could see a little round head. He ran over, and it was his brother Nick, whom he had helped to store away some grain last fall.

DICK FLICKERTAIL & NICK

"Where's everybody?" blurted out Dick, for he longed for company and picnics again on the South Bank.

"Search me," said Nick "you're the only one I've seen so far. Guess we're the first up alright. But say, don't forget about Billy, and remember you can't get down any of these holes as you could last fall."

"No, nor Billy can't either, till the frost goes out of the ground," chittered Dick, feeling safe in such a lonely world.

"Sh—," hissed Nick. "See that yellow lump over near the South Bank? Bet that's Billy out already. Let's see."

Just then a shadow passed over. Nick disappeared, and Dick saw a huge pair of wings just in time to dive into that hole after Nick.

"Hawks hungry this time of the year," snapped Nick,—

"Saw Rough-legs yesterday just back from the south."

"See any grass? That's what I'm interested in," blurted hungry Dick. "Better go slowly Dick for a few days, and use up that grain you stored away. Then others will be up, and we won't be so conspicuous." It was noon before Dick dared venture back to his hole, and to his surprise Mrs. Flicker was looking over the edge and nibbling some grass.

"Where did you get that grass?" sputtered greedy Dick without even saying good-morning. "I'm dying for something juicy."

"Well, you can't visit neighbours and gossip and find grass at the same time," remarked thrifty Fanny. "And besides, why didn't you clear the dirt away from this door and let the sun in, and how many days have you been out?"

But Dick was so glad to be out that he paid no attention to the scolding and went right past and down to the pantry for something to eat, although he really wanted something green and juicy, for gophers never drink. The green grass is their only water, and Dick was thirsty. Yes, Dick was thirsty.

DICK FLICKER AWAKES FROM HIS WINTER SLUMBER

See what a lot you learn by imagining just how animals live. Now you continue the story of "Dick Visits the Sunny South Bank" and of all last summer's friends that he meets, and their plans for this summer. Tell of the story that is going around that young Den Coyote sleeps with Billy Badger and that Billy boasts that a boy once stayed with him for two weeks. As a matter of fact, little seven-year-old Harry Service, of Birds' Hill, was lost for two weeks and found in a badger hole with his face all scratched and clothes torn, but he said that the badger brought him things to eat and that he liked Billy.

ANIMAL GROUPS

Since the energy that we get from the sun is stored in plants, it follows that only the animals that feed upon plants are storing that energy. The flesh-eating animals are destroying it.

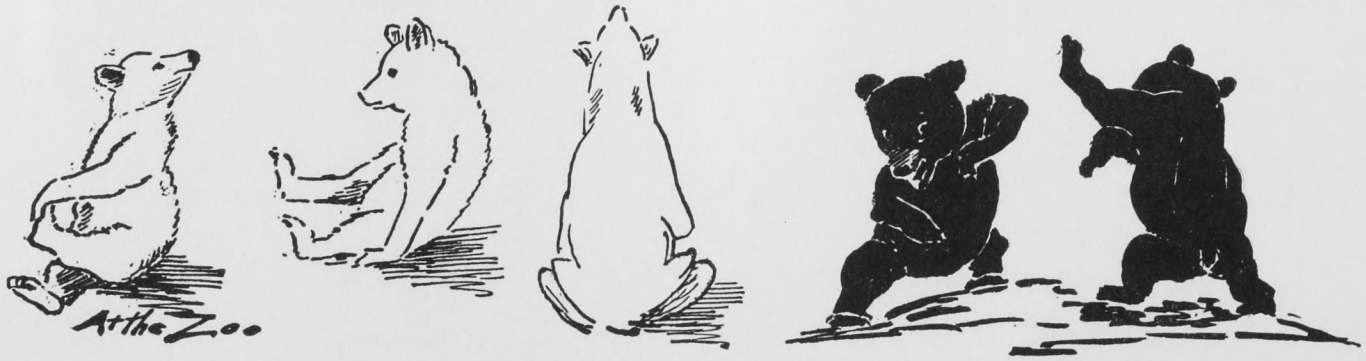
"All Flesh is Grass"

The wolf preys upon the rabbit, but, when rabbits are scarce, wolves are scarce (See *Fur and Game Resources*, page 19). They die of starvation, not being able to live on grass as the rabbit does. Our domestic animals are grass-eaters, converting grass into meat, milk, butter, and eggs. The hen converts grain into eggs. The horse converts grass into work. But the flesh-eaters would destroy this stored energy, and must be kept in check.

The grass-eaters include the domestic animals and the wild hoofed-animals,—the buffalo, the deer, the moose, the elk, and the caribou,—all beneficial, converting grass into flesh; also the smaller nibbling animals (rodents),—rabbits, beavers, muskrats, gophers, squirrels, and mice.

The flesh-eaters include cats and dogs and their wild kinds—the lynx, the wolf, and the fox,—all the musk animals—the weasel, the mink, the marten, the skunk, and the badger,—and also the bear, the shrew, and the bat. The last two are insect-eaters or insectivores, but insects are flesh. The flesh-eaters are called carnivores, and the grass-eaters are called herbivores.

1. Why are the grass-eaters so speedy?
2. What aids them in speed? Of what other use are hoofs?
3. What do the hoofless grass-eaters do for protection?
4. Which dig? Which climb? Which run? Which swim?
5. Why are flesh-eaters more fierce than grass-eaters?
6. Compare shrews and mice as to size, temper, and bravery.
7. Likewise compare the wolf and the buffalo,—the weasel and the rabbit.
8. Compare the teeth of flesh-eaters and grass-eaters. See *Lessons in Zoology*, Grade X Bulletin, page 18.
9. What birds are insect-eaters and what seed-eaters?
10. What birds are flesh or egg-eaters?
11. Which are beneficial and which harmful? See Bulletin No. 52, *Birds in Relation to Agriculture*, pages 5, 7, 8, 18, 19, 20.



ANIMAL GROUPS: PUPILS' WORK

The wolf, the coyote, and the fox have pointed noses, pointed ears, long legs, and bushy tails like dogs. In fact, the dog is a tamed wolf, and young coyotes are easily tamed. Elwyn Clark of Teulon is raising coyotes for fur, from pups he dug out of a den. The "husky" is part dog and part timber wolf. The large gray wolf disappeared with the buffalo, upon which it lived, and the timber wolf, once so common, is gradually disappearing. The coyote now outnumbers the wolf, twenty to one, despite the fact that about 5,000 are taken per year for fur and that there is a bounty on their heads for the sheep they destroy. The pelt is worth $10 to $15. Why is a coyote worth more than a dog? See *Fur and Game Resources*, pages 17, 19, 43.

The silver fox is now farmed for its fur, which is worth $100 to $200. Manitoba has 53 fox farms, and the industry is rapidly increasing. See pages 38-41.

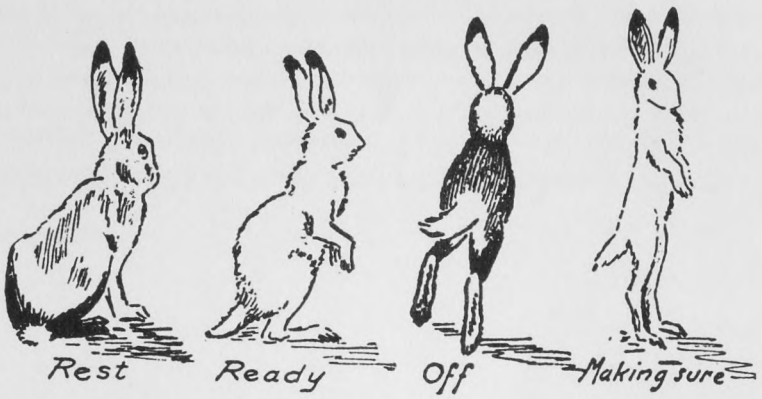
The Weasel Family

The Weasel-Mink-Martin Family also includes the otter, fisher, wolverine, skunk, and badger, a group of scent-bearing animals, with rarest and most expensive furs for their size. Just as bears leave signals with their claws on smooth bark of birch and poplar, and the wolves scent the trees along their trail, and the fox scents its catches of food, so all of the Weasel Family have scent glands with which they leave signals and records of their wanderings. The mink and the skunk have so developed these scent glands that they can defend themselves with them, the mink scent being quite as offensive as the skunk. But normally the scent is for family information only, and the trapper takes full advantage of this and always carries his scent bag of natural baits—skunk and fish for the fox, muskrat and fish for the wolf, beaver castorium for the lynx and the beaver, and so forth. Every trapper has his own secret scents and prizes the scent glands as part of the catch. The beaver makes castorized mud-patties and leaves them on mounds and prominent places as a record of his presence, and the "musk bogs" or beaver playgrounds are heavily scented with castorium. So no wonder the trapper soon learns the art of scenting his bait.

The skunk and the badger are the only diggers of the Weasel Family, and diggers are never in a hurry—slow and confident in the protection that the mother earth affords. The skunk, ranging over the whole continent, has developed regional differences: the prairie skunk is the larger with a black tipped tail three inches longer, and body four inches longer than other varieties; the northern skunk has a more slender tail with a white tip and is confined to the coniferous area east of Lake Winnipeg and north to the Hayes River. The larger prairie skunk is most plentiful around the Riding and Duck Mountains, where over half the skunk of the province are trapped. In 1924, 14,955 were trapped, and 10,676 in 1920, the price ranging from $2.00 to $3.50 per pelt. Thompson Seton says there were about 3,000 taken annually twenty years ago, or about one-fifth to one-eighth of the present catch, so that this animal seems to be increasing with settlement, despite the fact that coyotes, foxes, badgers, and owls take half the young, and trappers half the remainder.

The badger is confined to the dry prairie or the region of the gophers, upon which it largely feeds. Over half of the total number are around the Riding and Duck Mountains, only a dozen being trapped east of the Red River, and 20 between the lakes. Twenty years ago the badger population of the province was estimated at 20,000, ten per section in some places, but cultivation, destruction of gophers, trapping, and poison have reduced the annual catch to a 1,000 or so. Badger hair is worth eighty-five dollars a pound. It is used in making the best shaving brushes. It is also used in faking silver fox by anchoring in white badger hairs, and is then sold as "pointed fox."

JACK RABBIT OF THE PRAIRIES



	COMMON BUSH RABBIT NORTHERN, OR VARYING HARE OR SNOWSHOE RABBIT PETER RABBIT OF BEDTIME STORIES	JACK RABBIT PRAIRIE HARE, OR WHITE-TAILED RABBIT AND "JUMPER THE HARE"
Range	Northern woods extending south in bush prairie, northern and eastern.	Western plains spreading eastward into park country, Southern Manitoba.
Society	A few in one locality.	Solitary, seldom two seen in one locality.
Domain	Roams about on 20 or 30 acres.	Roams about in a mile circle.
Size	Average 3 pounds, 18 inches long.	Average 7 pounds, over 2 feet long.
Tail	One inch.	Four inches.
Feet	Large, with spreading toes.	Small feet, toes compact.
Ears	White inside, black tip outside.	Long with black tip inside and out.
Colour	White in winter and brown in summer.	Pale gray with long white tail.
Speed	Zig-zag bounds, tail up. Eight-foot bounds, four a second.	Long bounds straight ahead, tail down, twenty-foot bounds, two per second.
Young	Usually two in a litter in April or May. Nursed for two weeks.	Usually four in a litter in June or July. Nursed for a month.
Pets	Not so easily raised.	Easily raised as pets.
Life	Six to eight years.	Eight to ten years.
Parasites	Wood Tick, Dog Tapeworm, and Round-worms.	Rabbit Tick (Ixodes), Warble Fly, Dog Tapeworm, and Yellowpus Pneumonia.

Animals spread like seeds and weeds. Increase in numbers make it necessary. Peter Rabbit is the only rabbit in that famous spot in the Green Forest where so many meet, but not of the same kind. Jumper the Hare sometimes visits Peter, but there isn't enough food for both in the same spot. So Jumper hops back to the meadows where he has his own quarter section. He likes the farm (why?) and has followed the farmer wherever he farms the prairies, just as Boomer the Grouse has. A century ago there were no farms in Manitoba and no hares. Alexander Henry, who hunted and traded in the Red River Valley from 1795 to 1812, saw only one, and that was in North Dakota. Kennicott, the naturalist, saw none in 1856. The Hind exploration party saw none in 1858-9. Dr. Cadham says there were none in Manitoba in 1870, and Dr. Coues, the naturalist, travelled through Manitoba in 1873 and saw none till he got to the Missouri Coteau, fifty miles west of the Manitoba line. Even as late as 1882 Thompson Seton travelled all over Southwestern Manitoba without seeing or hearing of a Prairie Hare. Now they are common wherever the prairies are farmed. They have spread eastward across Manitoba during the last thirty years. In like manner the Pinnated Grouse had spread northwest with the cultivation of the prairies. In 1881 it was first seen near Winnipeg. It had reached Portage in 1882, Carberry in 1886, and Indian Head in 1895, and is now found wherever the prairies are farmed.

What other wild animals or birds like the farm, and follow the farmer? And why? Are wolves and hawks as likely to chase Jumper the Hare near buildings?

RABBITS

Read *Fur and Game Resources of Manitoba* in your school library, and on pages 6 and 7 you will see the fur animals that like the farm and increase with agriculture. See also pages 14, 15, middle of page 17, and the value of rabbits, page 43.

Write a short composition on Chinchilla Rabbits, Belgian Hares, or pet rabbits.

Or write a bedtime story on "Peter and Jumper Discuss their Enemies."

Make drawings of a rabbit, a cat, or a dog in familiar poses, as here shown of Jumper the Hare.

Why has Jumper longer ears than Peter?

Why has Peter bigger feet than Jumper?

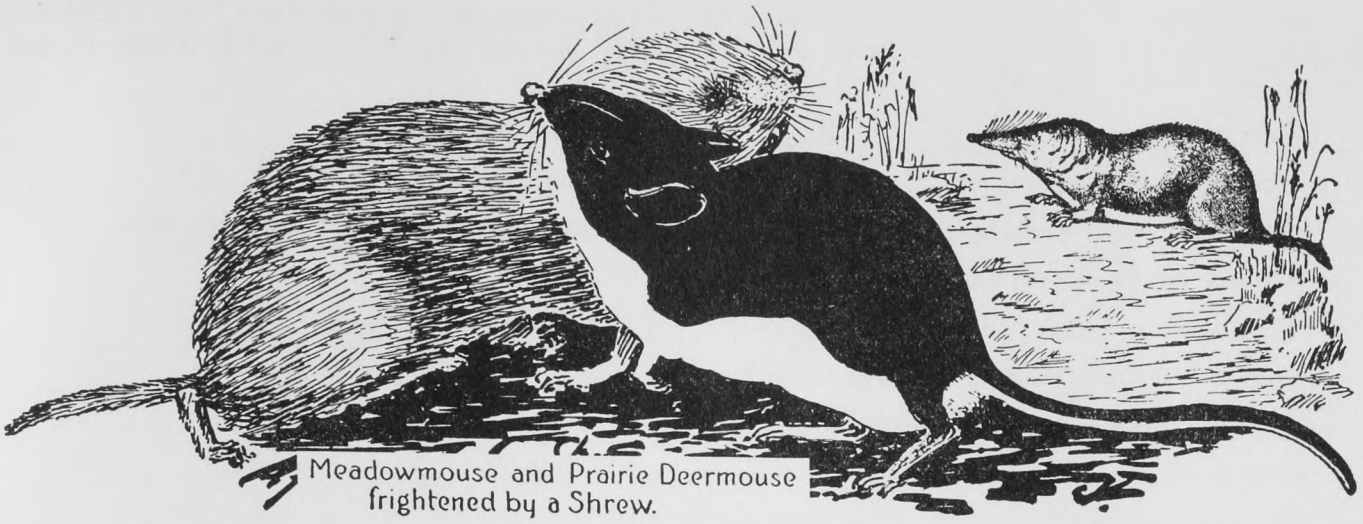
Does snow help or hinder animals in winter?

Why are rabbits so timid and weasels so bold?

How do rabbits signal each other? Why?

How and what do rabbits eat? What harm can they do?

MICE



Meadowmouse and Prairie Deermouse frightened by a Shrew.

Mice are almost as universal and as common as grass. They are everywhere, feeding upon plants and seeds and in turn becoming the food of hawks and owls, of fox and wolf, of lynx and weasel, and even falling prey to the tiny shrew, one-fifth its size.

Our common Meadow Mouse, with the small ears and short tail, is found everywhere in the Prairie Provinces. He is smaller, slenderer, and lighter in colour than the eastern Danny Meadow Mouse of Bedtime Stories. His tail is only $1\frac{1}{4}$ inches long, and his body 5 inches long. There are six broods of four to eight from April to November, and so during harvest there may be thousands in one field, under stooks and stacks, everywhere, cutting sheaf-bands and nibbling holes in granaries. Who are Danny's enemies? The butcher-bird, hawks, owls, the sandhill crane, snakes, and all the prowling flesh-eaters, and also prairie fires. Write a western bedtime story telling Danny's troubles as you see them (5 credits), or tell how the Meadow Mouse differs from the House Mouse.

More attractive is the gay Prairie Deer Mouse. It has white feet, is white underneath, and even its long tail is white on the under side and black on the upper side. It has large ears and feeds only at night. It is the only mouse with cheek pouches like gophers.

1. Why are its ears so large?
2. Why has it developed cheek pouches?
3. Why have chipmunks developed cheek pouches?
4. Why are they white underneath and dark above?
5. Name other animals, fish, and birds like this?

Shrews

Shrews differ from mice in being flesh-eaters or insect-eaters, and, as usual, are much smaller than grass-eaters or plant-eaters. They have long, pointed noses, with long whiskers, and the tiny eyes are covered with silky fur; they are blind, like moles,—in fact they are tiny moles, little as your little finger, with sharp, pointed teeth like moles and bats. Why? (1)

Although the smallest of animals, they seem able to take care of themselves. There are four kinds in Manitoba: Hoy's Shrew, Common Shrew, Marsh or Beaver Shrew, and Mole Shrew. Hoy's Shrew is the smallest and commonest in Manitoba. A dozen or more are sent in every winter for identification. Usually the cat brings them to the back door and says "Have you any use for this? I haven't." And if you smell the shrew, you'll see why. I think most cats are ashamed at not knowing a shrew a from a mouse. Write a bedtime story telling about it. (5 credits.) You see, many animals have a protective smell,—the skunk, the mink, the marten, the badger, and even the tiny shrew. Moreover, flesh-eaters have not the tasty flesh of

grass-eaters, nor does the flesh keep as well. So Tabby prefers the mouse, just as we prefer beef. In fact, is there any flesh-eater good to eat? (2)

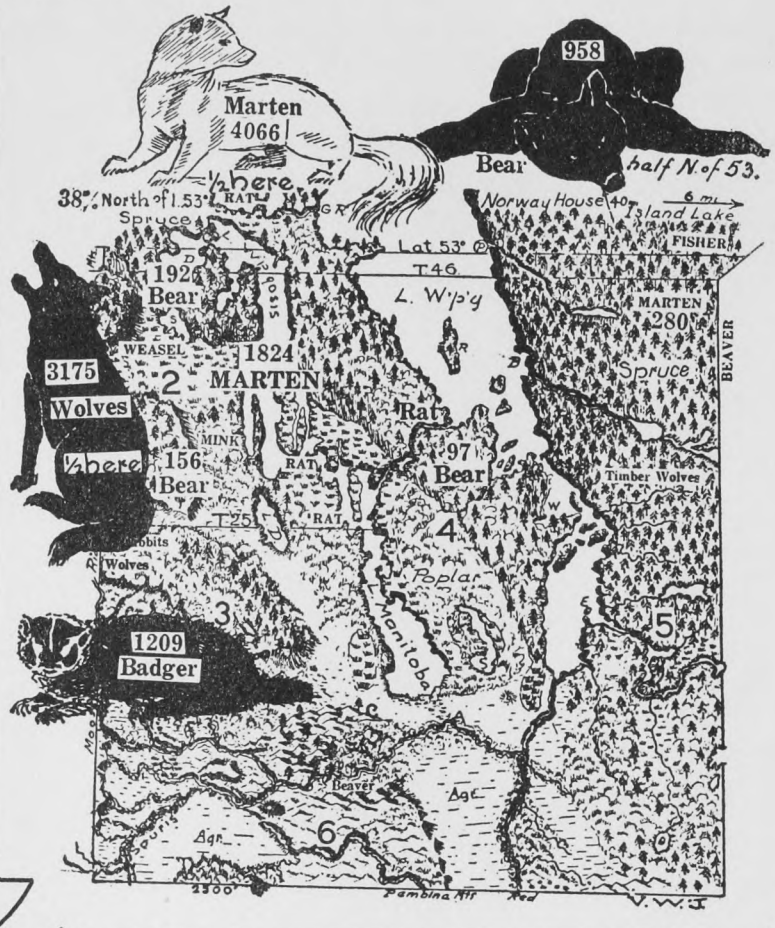
3. And why are flesh-eaters smaller than plant-eaters? Compare the weasel, mink, fox, dog, and cat, with the cow, buffalo, hippopotamus, and elephant.

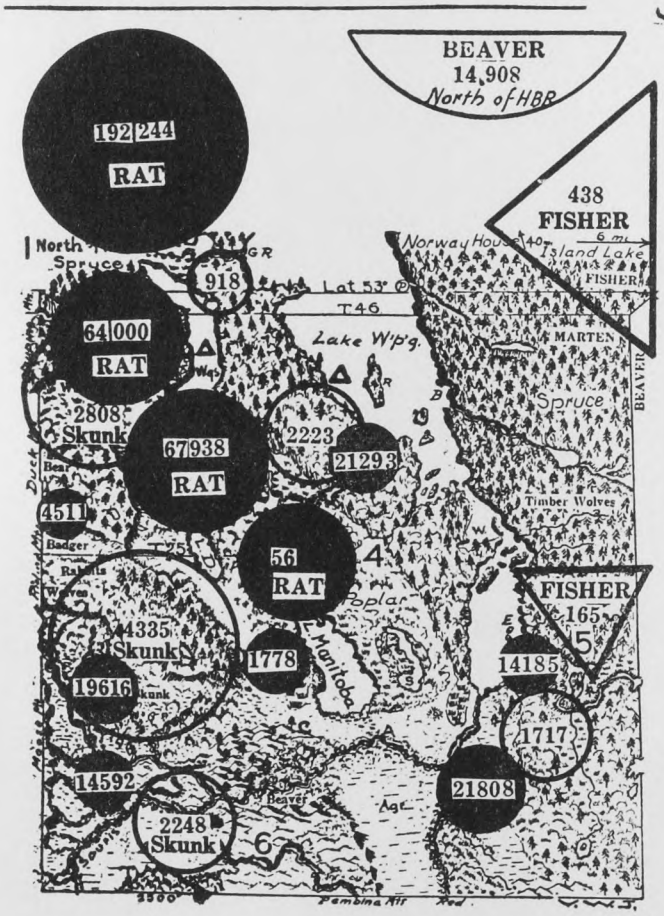
4. Give other reasons why we should eat more vegetables. If you never saw a shrew or can't trap one, we'll mail you one for the asking.

5. Why have shrews gone blind? Of what use are the whiskers?

FUR-BEARING ANIMALS

1. Why are badgers found on plains?
2. Wolves in the north?
3. Bears in the forest?
4. Muskrats in swamp?
5. What other animals thrive in water?
6. Name the swampy areas of Manitoba.
7. Colour them red or green.
8. What do the letters stand for on the map? A, B, C, L.D., E, G.R., P.W.,1, 2, 3, 4, 5, 6.
9. Why was Riding Mountains made a Game Preserve?
10. See *Fur and Game Resources*, pages 48 and 49.



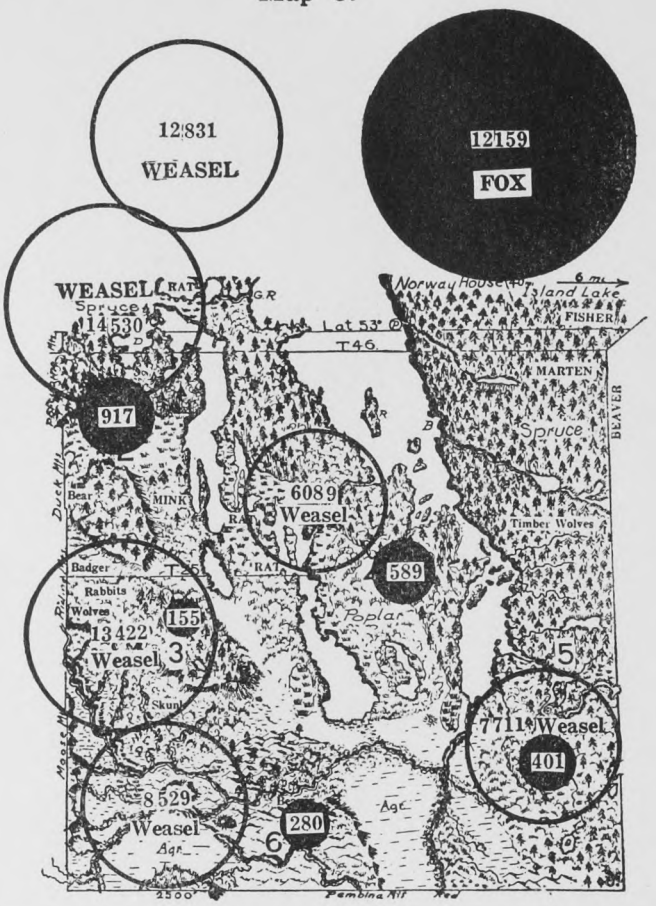


1. What fur animals are there in your part of the province?
2. What do you know about them?
3. What animals escape by digging?
4. By climbing?
5. By running?
6. Why are skunks so bold?
7. What fur animals are vegetarians?
8. What animals are flesh-eaters?
9. Why are flesh-eaters more fierce?
10. Is this an argument in favour of vegetable-eating?

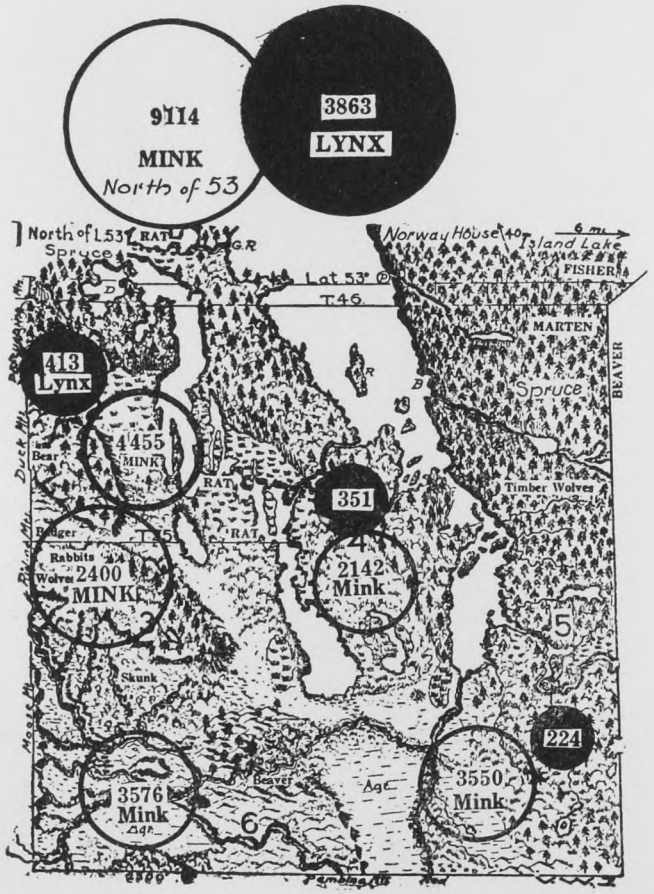
FUR-BEARING ANIMALS: PUPILS' WORK

1. Why does the weasel follow settlement and the fox retreat from it?
2. How does the weasel change colour and why?
3. What is another secret of its success?
4. Upon what does it prey?
5. Ermine is white or winter weasel.
6. Why so valuable, though small?
7. How many kinds of weasel have we?
8. How many kinds of fox?
9. To what group of animals does each belong?
10. Draw squirrels or gophers in familiar poses from life, or copy the line drawings here shown. Surely, if I can, you can.

Map C.



Map D.



1. The lynx is a wild cat, and cat-like in its habits. Such animals are called feline; hence, Felix—the cat.
2. Name others.
3. What is peculiar about them?
4. How do they differ from the canine, or dog-like animals?
5. Name our canine animals.
6. Name our musk animals.
7. Of what use is musk to animals?
8. Of what use to trappers?
9. Why are minks the worst enemies of muskrats?
10. Why is muskrat the most important fur? See *Fur and Game Resources*, page 9.

FUR-BEARING ANIMALS: PUPILS' WORK

DANNY AND NANNY MEADOW MOUSE GET A GREAT SHOCK

By Thornton W. Burgess

Here is a model bedtime story which takes you right into the animal world, into animal thoughts and ways.

You will remember that before the setting in of winter Danny and Nanny Meadow Mouse had moved up to Farmer Brown's barn. They liked that barn; it was a good place in which to spend the winter. The only ones living there at that time were Robber the Rat and his family and Nibbler the House Mouse. Danny and Nanny were afraid of Robber, but they were not afraid of Nibbler. In fact, Nibbler was afraid of them. As for their big cousins, the Rats, Danny and Nanny knew that all they had to do was to keep out of their way.

"What do you suppose has happened?" she whispered.

Danny knew all about that barn, for this was not the first winter that they had spent there. He found everything much as he had expected. Nanny soon decided where she wanted to live, and it was almost no time at all before they had a snug nest ready to be occupied. They had no worries. Robber the Rat couldn't get at them there if he tried, and he wasn't likely to try.

"You see," explained Danny, "Robber and his family have all they want to eat over here in this barn. Yes, sir, they have all they want to eat, and so they are not likely to bother us. Of course we must watch out for Black Pussy the Cat. But Black Pussy is stupid, if you ask me. She hasn't caught Nibbler the House Mouse yet, and Nibbler isn't exactly my idea of one who is really smart."

Nanny Meadow Mouse began to giggle. It was a squeaky little giggle. Danny looked at her very hard "What are you laughing at?" he demanded.

"I am laughing at the good opinion of yourself you seem to have," said she. "You must think you are a whole lot smarter than Nibbler."

"I do," declared Danny promptly. "All Nibbler has to do is to keep out of the way of Black Pussy. You and I have to keep out of the way of Reddy Fox and Jimmy Skunk and all the members of the Hawk family, and all the members of the Owl family not to mention Blacky the Crow and Shadow the Weasel and a few others. Of course we are smarter. But we are going to have a very easy winter here. You must admit, Nanny, that I did well when I thought of coming up here instead of spending the winter down on the green meadows.

Nanny was quite ready to admit this. In fact, she was highly pleased with her surroundings. So she and Danny made themselves at home and were more pleased with each succeeding day. In fact, Danny used to tease Black Pussy by showing himself just by way of having a little excitement. He knew all about the ways of Robber the Rat and all the members of Robber's big family. It was no trouble at all to keep out of their way. There was plenty to eat without the trouble of hunting for it. It was an easy life.

He was just in time to see something vanish behind the trunk of a tree.

And then one day, as Danny and Nanny were peeping out to make sure that Black Pussy was not about, they heard a great squeaking among the Rats. They heard the scampering of many little feet. Danny looked at Nanny, and Nanny looked at Danny. "What do you suppose has happened?" she whispered.

And before Danny could whisper that he hadn't the least idea, there appeared and almost at once disappeared a slim, white form. It was almost like a ghost—a little, slim ghost. But had it been a ghost, and had Danny and Nanny believed in ghosts, they wouldn't have been any more frightened than they were. They had received one of the greatest shocks of all their lives.

A WEASEL

"Shadow the Weasel," whispered Danny, when at last he got his breath. You know, he does sit up in just the same way that Peter Rabbit does. He sat up that he might look around better. He was just in time to see something vanish around the trunk of a tree. Instantly Shadow bounded toward that tree. As he did so he saw a tiny, dark form scamper across the snow towards an old stump. He got only a glimpse of it. "I wonder if that was a young Mouse," thought he, and bounded after it.

By the time he reached the old stump no one was to be seen. Shadow started around the old stump. Half way around he came face to face with—who do you think? It was Teeny Weeny the Shrew. Now, had it been anybody but Teeny Weeny, Shadow wouldn't have hesitated a second. He would have sprung quicker than you could catch your breath. But Teeny Weeny was different. Shadow could think of many things that he would like better for breakfast than Teeny Weeny. You see, Teeny Weeny is in a small way like Jimmy Skunk; he carries with him a very disagreeable perfume. It is apt to spoil the appetite of even a very hungry person . . . So Shadow hesitated.

Finish the story.

On one of the blank pages at the end of the book, write a story on "The Cat and the Shrew."

Here is a True Story of a Weasel by Harold Orchard of Miami, Manitoba

"Murray and I were hunting rabbits during Christmas holidays. We heard a rabbit squeal in the thick willows and on looking closely saw a rabbit throwing clouds of snow in its struggles. The snow was red with blood round about. Soon the rabbit turned on its back, and we saw a weasel hanging to its throat. We were within eight feet of it, but the weasel stuck to the rabbit and tried to drag its kill to cover. Murray grabbed the rabbit, but the weasel hung on and pulled. We threw the rabbit into a snow drift, but the weasel stuck to it and started dragging it away again. To tease it we again grabbed the rabbit, and the weasel would come right up and take hold of it and pull and finally showed fight for possession."

Can you tell of some real experience that you have had with animals like this? (5 credits.)

THE ROSE FAMILY

This well known family includes the Strawberry, Raspberry, Five-finger or Cinquefoil, Silver Weed, Three-flowered Avens, Yellow Avens, and all plants with flowers like the Wild Strawberry. Most of these plants have white and yellow flowers, the seeds loose in the centre, and a compound leaf, some like the Rose (pinnate) and some like the Five-finger (digitate).

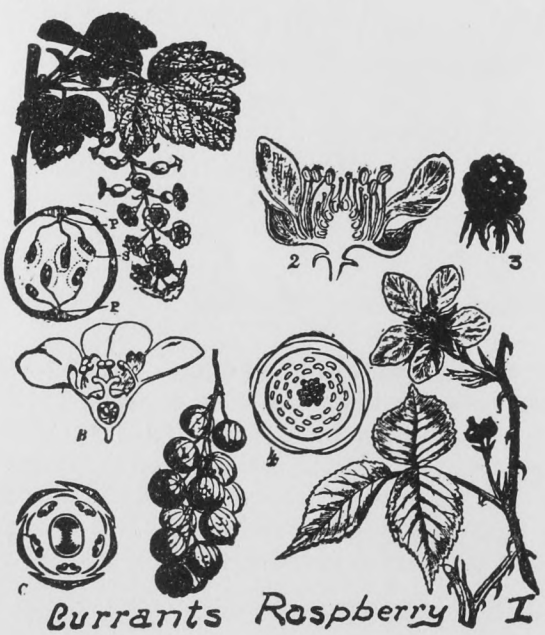
We have two kinds of Wild Strawberries. The northern one with the seeds in pits, and the other with the seeds on knobs. Which kind grows in your district? (1 credit.) How is it that the seeds of the Strawberry are on the outside? Is it a true fruit if it has no seed inside?

The Prairie Wild Rose is prickly: the Woodland Wild Rose is usually smooth. Can you account for this? In what other ways are they different? What kind of root has the Wild Rose? What kind of fruit? Why is it hollow? Why bright red? What purpose can the prickles on the stem serve? (7 credits.)

We have many kinds of Five-fingers or Cinquefoils. They are rough, straggly plants, with yellow flowers, and small seeds like clover seed. Silver Weed differs from the others in having a pinnate, compound leaf of many leaflets. How many? Why is it called Silver Weed? What is the colour of the flower? How can you tell it from a Buttercup? How does this plant spread? What other plants spread in this way? (5 credits.)

How does the Raspberry differ from the Rose,—in leaf, and in fruit? In what respects are they alike? How do Currants differ from Raspberries, in leaf, in flower, and in fruit? Do you think they belong to the same family? (5 credits.)

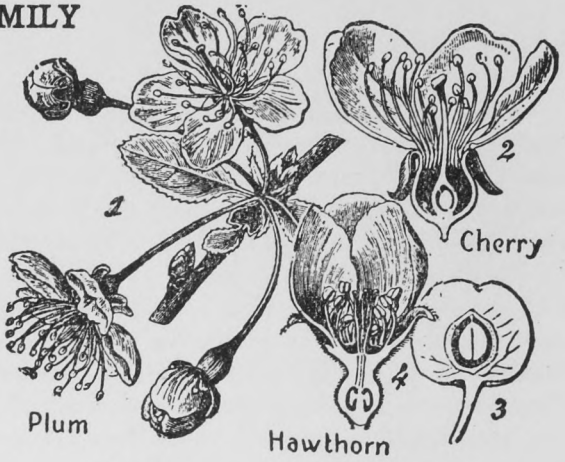
Three-flowered Avens is a beautiful, early, red prairie plant, with leaves, stems, and buds reddish. Make a drawing of the plant, the leaf, or the flower. Are all stems three-flowered? Count half a dozen. What colour are the flowers? How does the seed get sown so far? Draw a "seed" with the plume attached. Draw a "seed" of Yellow Avens with plume attached. In what other respects are these plants alike? (5 credits.)

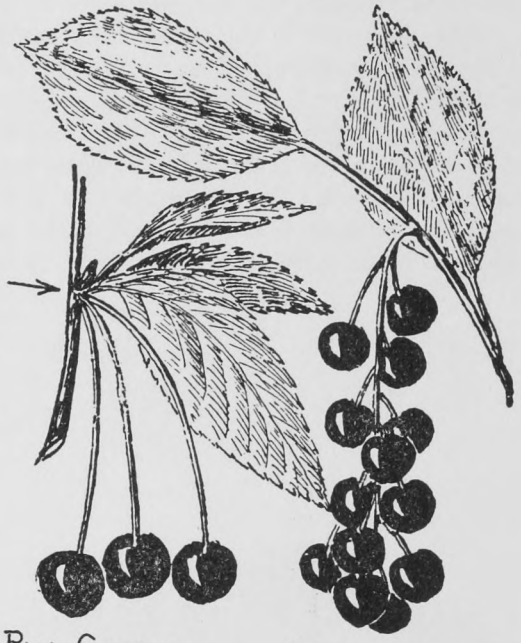


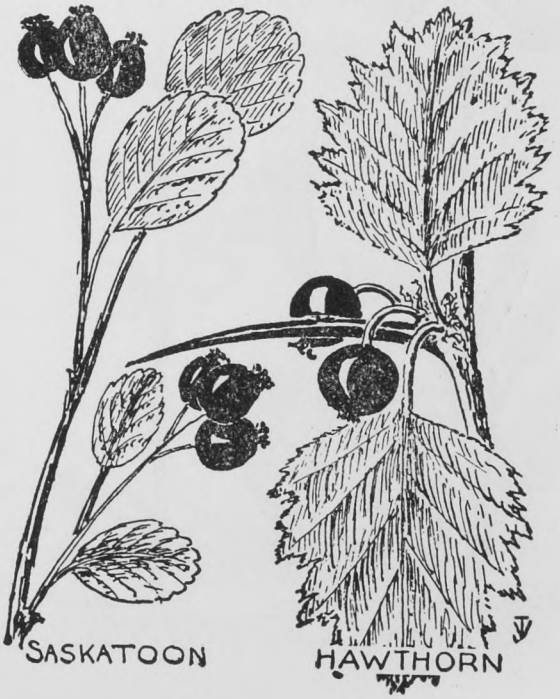
THE APPLE-PLUM FAMILY

Apples, Hawthorns, Saskatoons, Plums, and Cherries have flowers like the Rose, but the leaves and the fruits are different. The leaf is single, simple or entire, not compound as in the Rose Family, and the fruit is in one solid part, not in separate parts as a Raspberry. The seeds are imbedded in this solid part known as an apple or cherry.

Apples, Hawthorns, and Saskatoons have blossom ends on the fruit, and seeds in a core of five compartments with two seeds in each. Plums and Cherries have no blossom end and only one seed in a pit. Choke Cherries differ from other Cherries in growing in long bunches called racemes. The Pin Cherry grows in clusters of three, and the leaves are also in clusters. It grows to be a tree, whereas the Choke Cherry is only a shrub. Tabulate these differences in two columns. In what respect are Saskatoons and Hawthorns alike? In what respect are they different? (1 credit.) Compare leaves, flowers, branches, fruits, and seeds in two columns. (1 credit each.) Which is our most valuable wild fruit? Which is most nearly like the Apple? How does the Cherry flower differ from that of the Hawthorn? Compare drawings 2 and 4. Make drawings of the other fruit clusters. Small brush and black ink is the easiest way to represent a black fruit. The light spot shows it to be glosssy. Use brush and jet black ink as much as you can in your drawings. It gives you your quickest, easiest, and brightest effect. Even the drawings of leaves are best and most easily made in black. (1 credit each.)



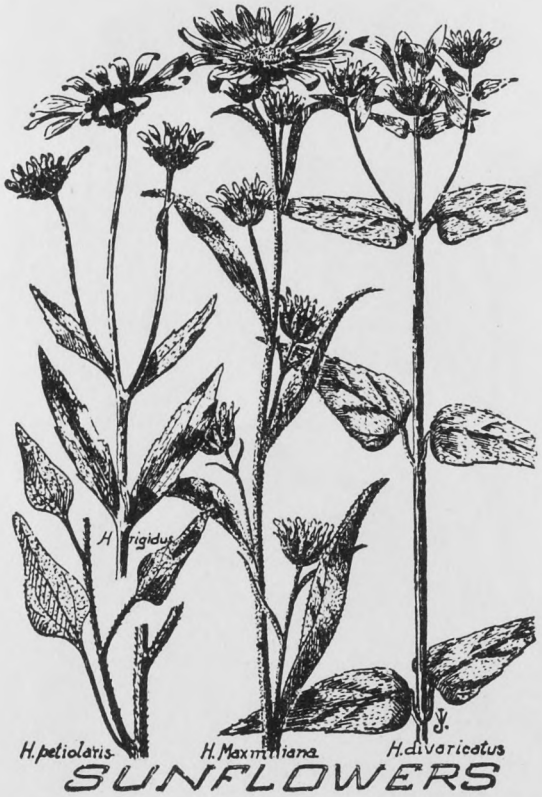




CONEFLOWERS

June—August—September

Daisies with high centres or knob centres are called Coneflowers. We have four kinds,—the Black-eyed Susan, is perhaps the most common and differs from the others in having entire paddle-shaped leaves and being hairy and rough all over. Its proper name is Rudbeckia hirta, which means hairy. All the Coneflowers have yellow ray flowers, but the tall one with the cut leaves has darker yellow or orange-coloured petals and a purple cone. It grows on the open, dry prairie, and Black-eyed Susan grows all over the province. The other Coneflower with a knob centre is uncommon, and, if you find one, you should send it in to the Botany Department, Manitoba Agricultural College, and get credit for it. You will also get one credit for each of the others that you find and identify. You should press them, as they are very pretty flowers and keep their colour well. Draw them and get credit. There is a green-headed flower commonly called Sunflower north of the Neepawa line. It is a weed in the grain field and very pretty along the roadside. In the garden it is known as Golden Glow when the flowers are double, but the leaves are exactly the same. Make a drawing of the leaf. (1 credit.)



SUNFLOWERS

Sunflowers have flat centres,—some dark, some green. The beautiful Gaillardia of the prairie has a purple centre, and the ray florets are half purple and the rest orange colour. Gaillardia and Coreopsis of the garden are closely related to the wild varieties. Of the true Sunflowers we have some ten kinds, three of which are very common: the Prairie Sunflower with leaves on stems and flower with purple centre; Maxmilian Sunflower with yellow-centred flower and narrow, stemless leaves; and the Woodland Sunflowers with opposite triangular leaves pointing outward (divaricatus).

Collect as many of the real wild Daisies as you can in August; press and mount them (1 credit for each) and send in to the Botany Department, Manitoba Agricultural College. For any you can name you will receive 1 credit each. Colour the Coneflowers and Sunflowers here shown. (2 credits.)

WILD NUTS

The Hazelnut is one of our most common shrubs; it is everywhere in the Poplar woods throughout the Red River Valley. There are two kinds: the Short-beaked Hazelnut and the Long-beaked Hazelnut. The latter prefers, however, the lime-stone ridges, such as those north and west of Stonewall. In other parts the Short-beaked Hazelnut is by far the most common, and is distinguished from the other by the hairs on the leaf stems. The Short-beaked Hazelnut grows in clusters of two, three, or four and the Long-beaked one in spiney galls. Collect the two kinds if you can and note the difference; make drawings of each. Which has the larger and the better nut? Why are hazelnuts so hard to find? What other nuts do squirrels store for the winter? Why are hazelnuts with a small hole in them empty? 5 credits if you can find out the thing that eats this nut when green and the reason it is empty.

We have only one Oak in Manitoba, the Bur Oak, so-called, because the acorn is very fuzzy or bur-like. Do squirrels store acorns for winter use? What colour do Oak leaves turn in the fall? Compare with the beautiful autumn tints of the Hazelnut leaf. Make drawings of each. (1 credit each.)

The Manitoba Maple has a double nut or seed called a key. Where these break loose, they fall slowly, revolving like a pin wheel. Crack open the bottom part and taste the seed. What birds like this seed? Draw the leaf and the key of the Manitoba Maple. Why is it not a true Maple?

1. Short-beaked Hazel.
2. Long-beaked Hazel.
3. Scrub or Bur Oak.
4. Ash-leaved Maple.

SIGNS OF SPRING: NATURE'S CALENDAR

	1925	1926	1928	1929	1930	1931
First Prairie Horned Lark, Emerson	Mar. 10					
First Prairie Horned Lark nest, Beresford	" 22					
First Crow, Winkler and Miniota	" 17					
First Meadowlark, Mather	" 17					
First Gopher out, Killarney	" 24					
First Pocket Gopher, Emerson	" 25					
First Grouse nest and eggs, Lyleton	" 27					
First Frogs croaking, Glenboro	" 29					
Frogs' croaking, Winnipeg	Apr. 2					
Frogs' eggs, Winnipeg	" 8					
Prairie Crocus, Sidney	Mar. 28	29				
Prairie Crocus, Bunclody		22				
Prairie Crocus, Miniota	" 31					
First Wheat sown, Miniota	" 31	21				
Buttercup, Sidney	" 31	A. 26				
Three-flowered Avens, Glenboro	" 29	A. 17				
Prairie Crocus, Rosser	Apr. 6	12				
Little Dog Violet, Sidney	" 6	15				
Gophers and Chipmunks, Glenboro	" 3					
Horned Lark fledglings, Dunrea	" 2					
Wood Ticks, Inwood	" 3					
Wood Ticks, Holland	" 10					
Sweet Colt's Foot, Beaver	" 30	M. 7				
Young Gophers, Clearwater	May 4					
Willows tinged with green	" 7	1				
Manitoba Maple leaves bursting	" 9	2				
Poplars in leaf	" 15	7				
Wild Plum in blossom	" 17	9				
Saskatoons fully out	" 19	16				
Oak stamens peeping	" 19	21				
Ash leaves peeping	" 19	21				
Elm buds bursting	" 19	16				
Woods a delicate green	" 24	17				
Leaves of all trees full out	" 31	27				
House Wren, Winnipeg	" 10					
Oriole, Winnipeg	" 20					
Kingbird, Winnipeg	" 22					
Cedar Waxwing, Winnipeg	June 2					
Mocassin-flower	" 10					
Indian Painted Cup	" 10					
Nannyberry in flower	" 12					

Record the first signs of spring in your district and compare with other parts of the province here recorded. How did the spring of 1926 compare with that of 1925? Why are birds and animals ahead of plants?

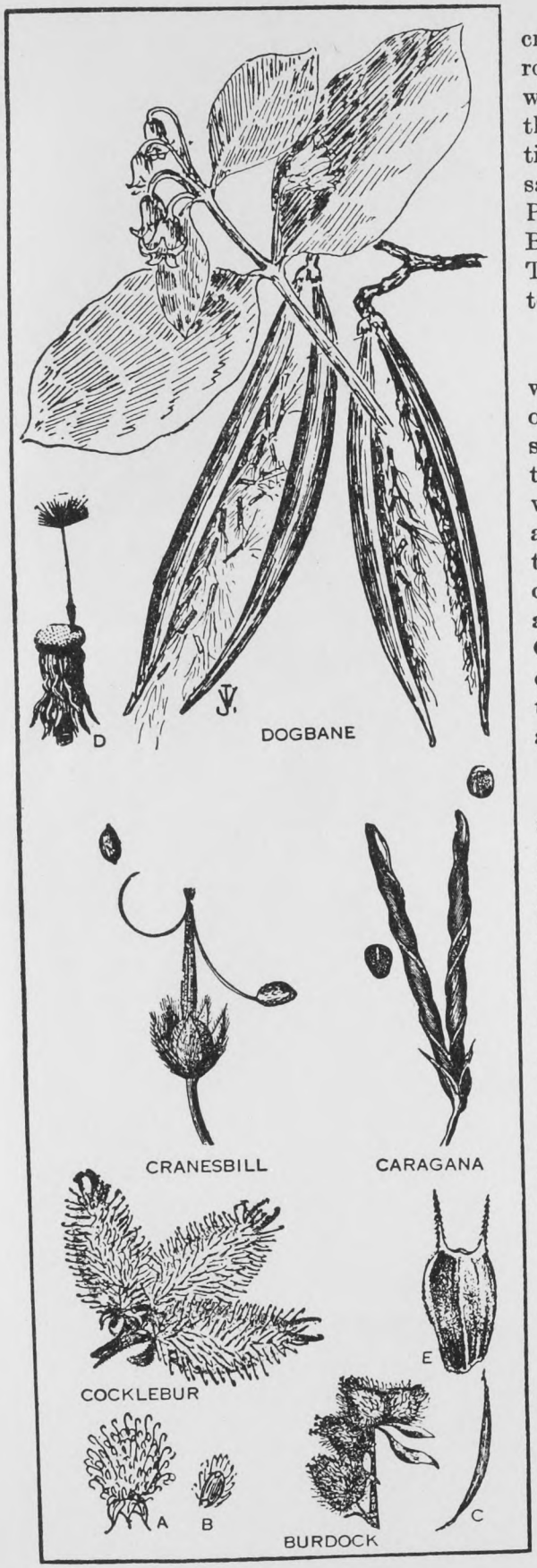
ANEMONES OR WIND FLOWERS

The Anemones or Wind Flowers are amongst the earliest spring flowers and are widely scattered over the province. The earliest prairie flower is the Pasque Flower or Prairie Anemone, sometimes wrongly called Prairie Crocus (2). A Crocus is a Lily or tiny Tulip, quite different from the woolly Prairie Anemone, with numerous stamens, 5 or 6 faint mauve petals, and wind-carried seeds. It belongs to the Buttercup Family and is a true Anemone or Wind Flower, blossoming as soon as the snow goes, usually about the first of April, and shedding its wind-carried seed in May. Its earliness makes it admired by all.

We have four other Anemones. The most beautiful perhaps is the Canada Anemone (1), with big white flowers and leaves against the stem. All other Anemones have leaves on stalks. The Long-fruited Anemone (3) has a small, greenish flower and a long head of cottony seeds, and is sometimes called the Cotton Plant. There is a red-flowered variety common in the western and northern part of the province and a green-flowered variety with a small round head of cottony seeds. (1 credit for each Wind Flower that you collect, press, and name.)

Why are they called Wind Flowers? How can the Prairie Anemone blossom so soon after the snow? Why is it a suitable floral emblem for the province?

NATURE'S PILGRIMS: THE SEEDS



The little baby plants, the seeds, have to leave their crowded homes just as people do when crowded. There is not room for all to grow right where the mother plant grew. They would be too thick, for plants have large families, some have thousands. Sow Thistles have two thousand, and so the tiny children, the seeds, leave their homes very early. Some sail away in parachutes like the Dandelion (d), Dogbane, Prairie Anemone, Three-flowered Avens, the seeds of the Elm, Birch, Maple, Ash, Poplars, Willows, Milkweed, and all the Thistles, Dandelions, Lettuce, Asters, and Daisies, sailing away to a new place where it will be less crowded.

The most beautiful and silky sails are those of the Milkweed and the Dogbane, both plants with milky juice and opposite leaves. The Dogbane has pretty pink bells in pairs, so that the long slender seed pods are also in pairs as shown in the drawing. You should know this plant; it grows everywhere in Manitoba. Press and mount it both when in flower and when the seeds start to leave home. Some plants, like the pigeons, drive their young from home, even throw them out, as does the Caragana, when its pods twist up on a hot day and flick the seeds several yards away. The pretty little Cranesbill does the same. It seems cruel, but it will give the children of the plant a better chance in life to start early on their own, for plants cannot move after they once settle down and take root.

Other children of plants are braver and more enterprising and catch on to passing animals and steal a ride, just as children often steal a ride on passing vehicles. Seeds which steal a ride in this way are called burs. They usually grow in sheltered places where there is no wind to carry a sail, and so they have to steal a ride if they want to get out in the world. Cocklebur and Burdock are known to all dogs, who find difficulty in getting the "hangers-on" to let go of their tails. When we take a walk in the woods, we come home with hundreds of little seed pilgrims, who wanted to see what the rest of the world was like and have hooked on to our stockings. The long, slender, black ones, pointed like needles at the end, are the seeds of Sweet Cicely (C). Those which are flat on one side and about the size of lady bugs with hooks on the back are the children of Black Snakeroot (B). The little brown ones with one hook are the children of Yellow Avens (A). Those with two hooks are called Bootjacks or Beggarticks. Those with four hooks are the children of Bur Marigold. Those brown ones, the shape and size of a ground beetle, and covered with brown hooks and with a brown ear, are the children of Wild Licorice. If you open up this bur you will find that it is a pod with several little peas or seeds inside. Wild Licorice grows along the roadside and pathways where it has a better chance to steal a ride. And the tiny gray seeds with hooks are the children of Blue Bur. They have most wonderful fingers, which never let go. They hook in all directions and cling and cling to you as if they liked strangers. With this collection on your

stockings, you can imagine what a sheep will gather with a woollen covering all over it. It gets Porcupine Grass seeds, Beard Grass seeds, and many other burs which we seldom see. So, with the gophers, squirrels, sheep, and dogs passing by, these venturesome little children of plants have a great chance of making pilgrimages into the world and making new homes in new parts where none of their brothers and sisters have been before.

And, as most discovery was made by water, so many plants migrate by water. The children sail off in floating seeds like the Basswood and Sour Dock, in the bladder-like seeds of all Sedges, in the light fluffy seeds which sail on the water like Sow Thistle and Canada Thistle, and in all of the downy seeds, which sail away to other shores.

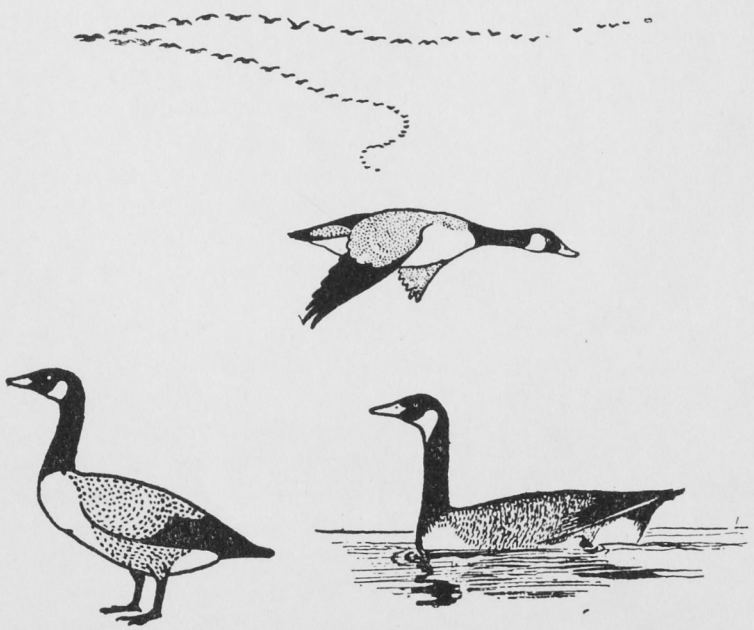
1. Mount a collection of wind-carried seeds on a black cloth under glass. A small cheap (15c.) picture frame makes a beautiful display. (10 credits if neatly done.)

2. Make a collection of burs in the same way and name them. (10 credits if neatly done.)

3. Make drawings of nature's pilgrims,—of the seeds or gay-coloured fruits showing how they get about. (1 credit each.)

4. Draw and colour the wild fruits and the birds which carry them afar. (3 credits each.)

5. Write an essay on Nature's Pilgrims, telling of their journeys, their mishaps, and their successes. (10 credits.)



The End of the Flight

STAR CLOCK


Designed by
V.W. JACKSON. M.Sc.
Revolve date to hour of night and stars are in position
From Gage's
N.S. WORK BOOK
MIDNIGHT
12
11
10
9
8
7
6 p.m
STAR CLOCK
FOR LAT. 50° N
E
N
W
S
Cut out this ellipse
for star dial of star clock
Revolve the star clock until the hour of night
is opposite the day of the month. The stars
will then be in exact position when the star
clock is held overhead.
Fold back the 4 corners over dial & paste on an octagon back
HOLD OVERHEAD
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